



TWEED SHIRE COUNCIL

Planning
Service

Tweed Valley Floodplain Risk Management Study (and Draft Plan) 2005

Part 1
Establish Appropriate Flood
Planning Levels for Residential
Development

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TWEED SHIRE COUNCIL

**Engineering & Operations
Division**

Phone: (02) 6670 2400

Fax: (02) 6672 7513

The Study is on the web at:

www.tweed.nsw.gov.au



Tweed Valley Floodplain Risk Management Study 2005

Part 1 - Establish Appropriate Flood Planning Levels (Residential Development) having regard to the findings of the Tweed Valley Flood Study 2005

1.1 Objectives of the Study Part 1

The objectives of this part of the study are to:

- Examine existing Council policies and planning controls for Flood Planning Levels (FPL) of Residential Development
- Identify options for amended residential development FPLs having regard to the flood levels predicted by the Tweed Valley Flood Study 2005
- Assess options
- Recommend a preferred option

The scope of this Part 1 study is limited. There are existing policies for development control of development on flood liable land, based on existing adopted FPLs. This Part 1 study only seeks to update the FPLs for residential development in accordance with the predicted levels in the Tweed Flood Study 2005. It does not seek to amend the underlying flood plain development control policies. This will be the subject of subsequent Parts of the Tweed Valley Floodplain Risk Management Study 2005.

1.2 What Are Flood Planning Levels?

The NSW Floodplain Development Manual defines as follows:

“Flood planning levels (FPLs) are the combinations of flood levels (derived from significant historical flood events or floods of specific AEPs) and freeboards selected for floodplain risk management purposes, as determined in management studies and incorporated in management plans. FPLs supersede the “standard flood event” in the 1986 manual”

AEP means annual exceedance probability

1.3 Existing Policies and Planning Controls for Flood Planning Levels

1.31 NSW Floodplain Development Manual 2005

Section K3 of the NSW Floodplain Development Manual states:

“FPLs for new residential development will generally be based on the 1% AEP flood. While there is potential to vary this, it should only occur where it can be clearly demonstrated that the situation is exceptional.

1.32 Tweed Local Environmental Plan 2000

There are no FPLs in the Tweed LEP 2000, however Clause 34 contains general flooding provisions:

“34 Flooding

(1) Objectives

- to minimise future potential flood damage by ensuring that only appropriate compatible development occurs on flood liable land.
- to minimise the adverse effect of flooding on the community.

(2) Where, in the consent authority’s opinion, land is likely to be subject to flooding, then it must not grant consent to development on that land unless it has considered:

- (a) the extent and nature of the flooding hazard affecting the land, and
- (b) whether or not the development would increase the risk or severity of flooding of other land in the vicinity, and
- (c) whether the risk or severity of flooding affecting the development could be reasonably mitigated, and
- (d) the impact of the development on emergency services, and
- (e) the provisions of *Tweed Development Control Plan No 5—Development of Flood Liable Land* and any other relevant development control plan.”

1.33 Development Control Plan No.5 – Development of Flood Liable Land

DCP 5 contains the following controls for FPLs of residential development:

3. Tweed Heads, Tweed Heads West, Tweed Heads South, Banora Point
Section 3.1 and Table 3.1
4. Chinderah and Fingal Road
Section 4.1 and Table 3.1
5. Fingal
Section 5.1 and Table 5.1
6. The Coastal Villages
Section 6.1 and Table 6.1
7. Kingscliff South of Waugh Street
Section 7.1 and Table 7.1
8. Murwillumbah, Condong & Tumbulgum
Section 8.1 and Table 8.1
9. The Rural Villages and the Clarrie Hall Dam Catchment
Section 9.1 and Table 9.1
10. Rural Areas
No levels provided

The above sections of DCP5 generally base the “Adopted Design Flood Level” on the ARI 100 year flood level, predicted by various one dimensional models for the appropriate catchment. The “Adopted Minimum Floor Level for Residential Development” is generally the “Adopted Design Flood Level” plus 300mm freeboard.

The major exception is the Tweed Area (Tweed Heads, Tweed Heads West and Tweed Heads South) where DCP5 states
“Following further investigations and advice from the Department of Public Works, Council on 5 September 1984, adopted a 1 in 100 year design flood level of RL 2.65 AHD and a minimum floor level of RL 2.95 AHD for Dwellings.”

This was a Council policy decision that was not strictly consistent with the ARI 100 year flood level predicted by the one dimensional ESTRY model (which ranges from 2.65m to somewhat lower).

In some localities (Tweed, Coastal Villages, Kingscliff) DCP 5 requires the minimum fill level for residential subdivisions/development to be the “Adopted Design Flood Level”. In other localities this is not required and filling may be limited to the level of the centreline of the adjacent street.

1.4 Identify Options for Amended Residential Development FPLs Having Regard to the Flood Levels Predicted by the Tweed Valley Flood Study 2005

1.41 Policy Background

Section K3.1 of the NSW Floodplain Development Manual advises: “In general, the FPL (minimum floor level) for standard residential development would be the 1% AEP flood event plus a freeboard (typically 0.5m) with minimum fill levels at the 1% AEP flood level.”

Note: FPLs can also be set for other types of development (aged care facilities, emergency facilities, critical infrastructure, commercial and industrial development. Determining these FPLs will be the subject of subsequent Parts of the Tweed Valley Floodplain Risk Management Study 2005.

DCP5 minimum residential floor levels are generally based on the 1% AEP flood plus a 300mm freeboard. The exception being the Tweed area where the design flood level is deemed to be 2.65m AHD.

1.42 Options for Residential Development FPLs

1.421 Scope

The flood levels predicted by the TUFLOW model in the Tweed Valley Flood Study are restricted to the parts of the Tweed Valley within the hydraulic boundary of that study (generally downstream of Byangum Bridge and Boat Harbour). It is not proposed to amend the FPLs of other areas.

1.422 Flood Level Contour Interval

The MapInfo representations of the TUFLOW model are in 0.1m flood level contour steps. This is large enough to be a meaningful interval, but, still small enough to give a close approximation to the actual predicted level. A larger interval, say 0.5m, could be used.

Option 1. Use a 0.1m flood level contour interval for determining design flood level.

Option 2. Use a 0.5m flood contour level for determining design flood level

1.423 Defining the “Design Flood” Level

There is no evidence of exceptional circumstances to warrant a general departure from the 1% AEP flood event.

In the lower Tweed area, past Council policy has deemed the design flood to be 2.65m AHD minimum in lieu of adopting predicted model levels. In the 2005 Flood Study the predicted 1% AEP flood levels in the Lower Tweed are typically:

Location	1% AEP Flood Level (m AHD)	Location	1% AEP Flood Level (AHD)
River mouth	2.6		
Near hospital	2.5		
Terranora Creek Branch		Tweed River	
Boyds Bay Bridge	2.4	Fingal Head	2.5
Terranora Ck Bridge	2.31	Shallow Bay	2.5
Cobaki Bridge, Kennedy Dr	2.3	immediately upstream of Shallow Bay	2.6
Trutes Bay	2.4		
Cobaki Broadwater	2.3		
Sandy Lane	2.3		
Cobaki Bridge, Piggabeen Rd	2.4		
Cobaki Ck, Piggabeen Ck junction	2.5		
Cobaki Creek 400m above Piggabeen Ck junction	2.6		

The model provides peak levels for the 1% AEP flood based on an envelope of two events, a 1% AEP (ARI 100 year) river flood with a 5% (ARI 20 year) ocean condition and a 1% AEP (100 year) ocean condition with a 20% (ARI 5 year) river flood.

In this model the levels are at 2.6m AHD at the river mouth, then grade lower upstream for several kilometres (as the ocean influence decreases further inland), then start to rise again as the influence of the river flooding dominates.

Downstream of Shallow Bay and the Cobaki/Piggabeen Creek junction ocean conditions dominate, upstream of these locations river conditions dominate. This produces the paradox of the low point of the model being a few kilometres upstream of the river mouth.

Option 1. Use the 1% AEP flood level from the Tweed Valley Flood Study 2005 as the base design flood level for residential development FPLs

Option2. Continue current policy practice by using the 1% AEP flood level from the Tweed Valley Flood Study 2005, with a minimum of 2.6m AHD as the base design flood level for residential development FPLs. (note: 2.6m is suggested rather than 2.65 to be consistent with the proposed 0.1m flood level contour interval)

1.424 Freeboard

The freeboard for residential floor levels above the “design flood level” adopted in DCP5 is currently 300mm. This is less than that suggested by the NSW Floodplain Development Manual ie. “typically 500mm”. The issue of freeboard is discussed in detail in Section K5 of the manual. Freeboard is in effect a safety factor than can provide for:

- uncertainties in flood level estimates
- local differences that influence flood levels that cannot be accounted for in models
- wave action
- changes in rainfall patterns, ocean levels, climate change
- cumulative effect of infill development

Option 1. Continue with 0.3m freeboard

Option 2. Adopt the freeboard suggested in the Manual of 0.5m

1.425 Impact of the PMF

Section A6.3 of the NSW Floodplain Management Manual advises:

“ Whilst Councils are encouraged to consider a full range of floods up to and including the PMF when determining FPLs it is expected that the FPL for residential development will generally be based on a 1% AEP flood event. FPLs are considered on the basis of social, economic, cultural and environmental factors, as well as flooding considerations.

The benefits from assessing the full range of floods up to the PMF is principally derived from a much greater understanding of continuing risk and management measures needed to deal with it. As part of this, it provides key information on controls and consequences for emergency response and recovery planning, to input into local flood planning.”

This Part of the Tweed Valley Risk Management Study 2005 does not seek to amend underlying flood plain development control policies. These may be influenced by the PMF and will be the subject of subsequent Parts of the Study. For this Part of the study, there is a need to establish residential development FPLs for land identified in the Study as being above the 1% AEP flood event, but, would be inundated in the PMF. These areas are mapped in the Flood Study, but, as underlying ground levels are not accurately determined there is a risk that some of these areas could be lower than the 1% AEP level. Accordingly these areas should adopt the design flood level of the adjacent area that is inundated by the 1% AEP flood event.

Option 1:

Areas mapped as inundated by the PMF, but, are outside the area inundated by the 1% AEP flood event adopt the design flood level of the adjacent area inundated by the 1% AEP flood event.

Option 2:

Do not regulate minimum residential floor levels in areas mapped as inundated in the PMF, but, not inundated in the 1% AEP flood event.

1.5 Assessment of Options

Element	Options	Assessment
Flood level contour interval	0.1m	Needs more complex mapping than larger interval, but, still readily accessed from the model; At a lot level, more closely represents model predictions than larger intervals
	0.5m	Simpler mapping than smaller intervals; Will lead to unnecessarily high levels at lower boundaries of contour intervals
Base "design flood level"	1% AEP flood level in Tweed Valley Flood Study 2005	Consistent with NSW Floodplain development manual; Inconsistent with previous policy of having 1% ocean level as minimum design flood level
	as above with minimum 2.6m AHD	Minimum level is more conservative than NSW Floodplain Development Manual; Consistent with current Council policy; Provides additional allowance for climate change, ocean level rise etc; Higher cost for subdivision fill and building levels

Element	Options	Assessment
Freeboard (minimum height of residential floors above “design flood level”)	0.3m	Consistent with current Council policy Inconsistent with NSW Floodplain Development manual; May be difficult to justify in terms of Council’s “duty of care”
	0.5m	Consistent with NSW Floodplain Development Manual; Acceptable “safety factor” More conservative than current Council policy; Buildings may be more costly; 0.5m step above lots filled to design flood level may be awkward; Floor levels of infill housing will be different to neighbouring existing houses
Areas inundated by PMF but not by 1% AEP flood event	Adopt same design flood level for residential development as adjacent area inundated by 1% AEP flood event	Provides safety net minimum residential floor level for these areas, particularly if actual lot ground levels are lower than anticipated in the flood study; s149 certificates will advise that these areas are affected by policies that restrict the development of the land because of the likelihood of flooding
	Do not set FPLs for these areas	Risk of these areas being inundated in 1% AEP flood event if actual lot ground levels are lower than anticipated in the flood study

1.6 Recommended Preferred Option for the Tweed Valley Floodplain Risk Management Study 2005

Part 1 - Establish Appropriate Flood Planning Levels for Residential Development

Based on assessment of the options it is recommended that:

(a) Flood Planning Levels (FPLs) for residential development in areas covered by the Tweed Valley Flood Study 2005 shall be as follows:

(i) "Design Flood Level" - the 1% AEP flood level as designated in Tweed Valley Flood Study 2005 with a minimum of 2.6m AHD. The level for individual properties is to be rounded up to the nearest 0.1m.

(ii) Minimum floor level for residential development shall be "design flood level" plus 0.5m.

(iii) Areas inundated by PMF but not by 1% AEP flood event must adopt the same design flood level for residential development as adjacent areas inundated by 1% AEP flood event

(b) Draft Part 1 of the Tweed Valley Floodplain Risk Management Plan – Establish Appropriate Flood Planning for Residential Development, be prepared in accordance with this recommendation

1.7 Draft Part 1 of the Tweed Valley Floodplain Risk Management Plan 2005 – Establish Appropriate Flood Planning Levels for Residential Development

The draft Part 1 Plan is appended as Annexure A

Annexure A

Draft Part 1 of the Tweed Valley Floodplain Risk Management Plan – Establish Appropriate Flood Planning Levels for Residential Development

1. Objectives

- Adopt flood planning levels for residential development that are recommended by Part 1 of the Tweed Valley Floodplain Risk Management Study 2005 - Establish Appropriate Flood Planning Levels for Residential Development
- Identify appropriate implementation measures

2. Flood Planning Levels for Residential Development

(a) Flood planning levels (FPLs) for residential development in areas covered by the Tweed Valley Flood Study 2005 shall be as follows:

(i) “Design Flood Level” - the 1% AEP flood level as designated in Tweed Valley Flood Study 2005 with a minimum of 2.6m AHD. The level for individual properties is to be rounded up to the nearest 0.1m.

(ii) Minimum floor level for residential development shall be “design flood level” plus 0.5m.

(iii) Areas inundated by PMF but not by 1% AEP flood event must adopt the same design flood level for residential development as adjacent areas inundated by 1% AEP flood event

3. Implementation

The revised FPLs should be implemented by an amendment to Development Control Plan No.5 Development of Flood Liable Land.

Draft version 2.3 of DCP 5 which incorporates these amendments is appended to this plan.