



TWEED SHIRE COUNCIL

Planning  
Service

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

Part 2  
Planning Controls for High  
Flow Areas

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## **Tweed Valley Floodplain Risk Management Study 2005**

### **DRAFT Part 2 – Planning Controls for High Flow Areas**

#### **2.1 Objectives of the Study Part 2**

The premise of this Part of the Tweed Valley Floodplain Risk Management Study is that in order to minimise the impact of development on flooding behaviour, the majority of development should take place outside of those areas of the floodplain that convey the majority of flood waters.

It follows that in order to minimise the cumulative impacts of development in flood liable areas, suitable development controls need to be applied to areas identified as being “high flow” areas.

The objectives of this part of the study are to:

- Examine existing Council policies and planning controls for development of flood liable land as they relate to the cumulative impact of development on the conveyance of floodwaters across the floodplain
- Identify options for appropriate development controls for high flow areas of the floodplain, to minimise the cumulative impacts of developments that have the potential to restrict flood flows and adversely impact on the flooding of other properties, having regard to the findings of the Tweed Valley Flood Study 2005
- Assess options
- Recommend a preferred option

The scope of this Part 2 study is limited to minimising the cumulative impacts of development on flooding behaviour. This Part 2 study is part of a larger review of existing floodplain development policies, which will result in subsequent Parts of the Tweed Valley Floodplain Risk Management Study 2005.

#### **2.2 How are “High Flow” Areas Defined?**

The Tweed Valley Flood Study does not include the assessment or mapping of flood hazard categories for the floodplain. The Flood Study was limited in its scope to predicting flood levels and velocity vectors at each model node for each time-step of each modelled flood event.

As discussed in Section 5 of the Flood Study, a velocity by depth ( $v \times d$ ) product classification of  $v \times d < 0.3$  and  $> 0.3$  was used to hydraulically define, in a series of maps, the Tweed River Floodplain. A  $v \times d$  product  $> 0.3$  indicates areas of significant flood flow on the floodplain. In the Flood Study map series, “high flow” areas are depicted in red, and “low flow” areas in blue.

Based on the definition used in the 1986 NSW Floodplain Development Manual, it is widely held that “floodway areas” are areas with  $v \times d$  product  $> 1$  and/or areas where obstruction of the flood flow path will cause adjacent upstream flood

levels to increase by 0.1m or more. A more qualitative definition is used in the current version of the Manual:

***floodway areas*** *those areas of the floodplain where a significant discharge of water occurs during floods. They are often aligned with naturally defined channels. Floodways are areas that, even if only partially blocked, would cause a significant redistribution of flood flow, or a significant increase in flood levels.*

When areas with  $v \times d > 1$  were mapped as part of the Tweed Valley Flood Study, it produced limited, isolated floodway areas, with no indication of how these floodway areas were connected hydraulically.

Several other  $v \times d$  products were investigated during the study and it was considered that the 0.3 product most effectively depicted the desired continuity of out of river flow paths, which this Part of the Risk Management Study aims to preserve.

As such, the "high flow" areas are considered to be a combination of "floodway areas" and "flood conveyance zones". If flood conveyance zones are not protected from development in a manner similar to floodway areas, it is likely that the behaviour of the floodway areas will be adversely altered.

This hydraulic categorisation process, references to case law and relevant case studies, are discussed in the conference paper "Floodways, Can One Size Fit All?" (Howells, L.C., McLuckie, D.B., Collings, G.B., Lawson, N.V. *Proceedings*, 43<sup>rd</sup> Annual Conference, NSW Floodplain Management Authorities, Forbes, 2003).

It is considered that due to the apparent correlation of the mapped high flow areas with known floodpaths, the  $v \times d > 0.3$  high flow categorisation is adequate to define the main flood flow areas of the Tweed River Floodplain. The relative "hazard" of this velocity depth product, in terms of the threat to personal safety or structural damage, has not been investigated.

## **2.3 Existing Policies and Planning Controls for Minimising Cumulative Impacts of Development on Flooding**

### **2.3.1 NSW Floodplain Development Manual 2005**

The NSW Floodplain Development Manual Section G6.1 – "Impacts of New Development on Flooding" states:

*"Development can impact upon flood behaviour (levels, flows and flowpaths) and therefore the flood exposure of other properties (and their inhabitants).*

*Impacts can be due to:*

- *blocking by fill of, or buildings on, floodways;*

- *removing areas for flood storage within the floodplain, due to filling or levees; and*
- *increasing the amount of impervious area in a catchment which, without appropriate management, increases the overall volume and peak runoff from the area.*

*Impacts need to be considered cumulatively to enable effective management of flood risk.”*

Section G6.2 “Determining Reasonable Flood Related Development Limits” also states:

*“Indicative flood related development limits can be determined based upon an understanding of the flood behaviour and the impacts... There are certain areas where development would reasonably be excluded:*

- *areas where development will have significant adverse impacts on flood behaviour. This may be due to blockage of floodways (increasing upstream flood levels or redirecting flows) or filling of flood storage areas (increasing downstream peak flood flows or redirecting flows). Assessment involves consideration of the cumulative impacts of proposed new areas on flooding...;*
- *areas where flood hazard is too high and cannot effectively be reduced to acceptable levels by management measures. Emergency management is an important consideration as to whether an area is too hazardous for development due to flooding (eg islands...); and*
- *areas of important flood dependant ecosystems.”*

State Government policy therefore supports the control and restriction of development in areas where such development could have significant adverse impacts on flooding behaviour, including high flow areas.

### **2.3.2 Tweed Local Environmental Plan 2000**

Clause 34 of the Tweed LEP 2000 contains the following 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.*

The objectives of this clause are to minimise the impacts of flooding on development and the community. It does not address the issue of protecting the natural hydraulic properties of the floodplain from development, which is the objective of this Part of the Risk Management Study. This issue is discussed in more detail in Section 2.9 of this Study.

### **2.3.3 Development Control Plan No.5 – Development of Flood Liable Land**

DCP No.5 refers to an independent series of maps held by Council identifying flood hazard in each flood prone locality. The mapping from the Tweed Valley Flood Study supersedes these maps for localities within the modelled area.

Many localities are subject to development controls that prohibit certain development from “Floodway” and “High Hazard Flood Storage Areas”. Cumulative impacts of development are not specifically addressed, but in certain cases are indirectly controlled by limiting filling and building enclosure below the design flood level within a locality. These restrictions apply mainly to residential development.

### **2.4 Zoning of High Flow Areas**

The majority of floodplain land subject to the high flood flow classification ( $v \times d > 0.3$ ) is zoned 1(b) Agricultural Protection. This land is located on both sides of the Tweed River between Murwillumbah and Chinderah, and along the Rous River.

Other zoned land identified within the high flow areas includes 1(a) Rural in Chinderah and South Murwillumbah, 2(a) Low Density Residential in South Murwillumbah and Condong, 3(c) and 3(d) Business in South Murwillumbah and Chinderah, and 4(a) Industrial, 5(a) Special Uses and 6(a) Open Space in South Murwillumbah.

### **2.5 Options for Development Controls in High Flow Areas**

#### **2.5.1 1(b) Agricultural Protection Zoned Land**

This land is mainly utilised for the production of sugar cane. Continuation of this or similar cropping or grazing uses should not adversely affect the high flow areas of the floodplain.

The zoning provides the potential for large scale developments such as extractive industries or road transport terminals, which if they are bunded or filled to increase their flooding immunity, or if they involve large buildings or other obstructions, will restrict and divert flood waters.

Residential dwellings are only allowed on lots larger than 10ha or 40ha depending on the zone mapping.

Refer to Table 2.5 for options for development controls for 1(b) zoned land, and assessment of these options.

### **2.5.2 1(a) Rural Zoned Land**

While rural zoned land is similar in character and usage as agricultural land discussed above, this zoning allows for a much broader range of potential development, including hospitals, places of public worship, institutions, light industries, storage units, marinas and transport terminals. By their nature, all require some degree of flooding immunity, meaning filling and obstruction of flood flow paths.

While residential dwellings have similar restrictions as agricultural zoned land, the zoning does allow housing for older people or people with disabilities. While this study does not consider in detail flood hazard, and while issues such as evacuation should be a merit consideration of any residential development on the floodplain, this kind of residential development is considered incompatible with high flood flow areas.

Refer to Table 2.5 for options for development controls for 1(a) zoned land, and assessment of these options.

### **2.5.3 2(a) Low Density Residential Zoned Land**

High flood flow areas encroach into residential zoned land, mainly in South Murwillumbah between Colin and Stafford Streets, and in Condong along Tweed Valley Way between Reserve Creek Road and Cane Road. These high flow areas typically occur where the banks and levees along the Tweed River are overtopped and flood waters travel at high velocity towards flood storage basins and out of river flow paths. Flood gradients through residential land in South Murwillumbah are particularly large, and many dwellings were destroyed or badly damaged along River Street during the 1954 and 1974 flood events.

Many of the worst effected residential properties have been rezoned 6(a) Open Space. A voluntary purchase scheme was adopted in South Murwillumbah as part of the Murwillumbah Floodplain Management Plan 1989, and funding is regularly sought from the State and Commonwealth Governments to facilitate these purchases.

Refer to Table 2.5 for options for development controls for 2(a) zoned land, and assessment of these options.

### **2.5.4 3(c) & 3(d) Business Zoned Land**

In Chinderah Village, two relatively small areas of 3(d) Waterfront Enterprise zoned land are affected by high flood flows, one south of Ozone Street, and the other at the northern extent of the village adjacent to Barneys Point Bridge.

The southern area contains a large sand quarry, while the northern high flow area contains a caravan park, service station and residential dwellings. Both areas are likely to attract demand for redevelopment (multi-dwelling housing is prohibited unless above non-residential ground level development).

Any retail or commercial development in these areas will require a degree of flood immunity, requiring filling and obstruction of flow. Continuous shop frontages in particular will restrict and divert these high flood flows.

Similar issues are encountered for the limited portion of 3(c) Commerce and Trade zoned land in South Murwillumbah (Stafford Street). As such, the same development control options are considered to apply for this study.

Refer to Table 2.5 for options for development controls for 3(c) and 3(d) zoned land, and assessment of these options.

#### **2.5.5 4(a) Industrial Zoned Land**

A significant region of high flood flow passes through the South Murwillumbah flood basin, which is bound to the north and east by industrial zoned land. Council's airfield directs the main flow path towards Condong Creek and Reserve Creek Road and the agricultural land beyond. A single industrial zoned allotment (Lot 4 DP 591604) remains undeveloped at the downstream (north eastern) end of the airfield, and is the main outlet for the flood basin. A secondary outlet is located at Railway Street, with high flood flows encroaching into industrial zoned land currently used for sugar cane production.

A cumulative development scenario for the industrial zoned land in South Murwillumbah was recently modelled as part of rezoning proposal for a new industrial precinct upstream of the South Murwillumbah flood basin, in Wardrop Valley/Fernvale. This modelling was undertaken by WBM Oceanics using a draft version of the Tweed Valley Flood Model. The resultant report illustrated the importance of this basin in diverting flood waters away from the main river channel and protecting the Murwillumbah Levee from overtopping.

Refer to Table 2.5 for options for development controls for 4(a) zoned land, and assessment of these options.

#### **2.5.6 5(a) Special Uses**

Comparatively small fragmented areas of Special Uses zoned land fall within the mapped high flow areas. In South Murwillumbah and Condong this land is zoned for Schools. By nature, school developments generally maintain large percentages of open space, and as such should not pose significant impacts on flooding behaviour.

Refer to Table 2.5 for options for development controls for 5(a) zoned land, and assessment of these options.

### **2.5.7 6(a) Open Space**

Areas of observed high flood flow and property damage in historical floods in South Murwillumbah have been previously rezoned from residential use to open space. The Tweed LEP includes the following “hardship” clause, to facilitate Council’s acquisition of privately owned 6(a) zoned land:

#### **49 Acquisition and development of certain land in Zones 5 (a) and 6 (a)**

##### **(1) Objective**

- *to set out the requirements for the acquisition and interim development of land set aside for future local roads, open space and other Council purposes.*

##### **(2) This clause applies to land within:**

*(a) Zone 5 (a) shown on the zone map by red lettering as “Drainage”, “Council Purposes” or “Council Road”, or*

*(b) Zone 6 (a), except land held by a public authority for the purposes of public open space.*

##### **(3) The owner of any land to which this clause applies may, by notice in writing, require the Council to acquire the land.**

##### **(4) On the receipt of a notice referred to in subclause (3), the Council must acquire the land unless the land may be required to be provided as a condition of consent to the carrying out of development.**

##### **(5) A person may, with development consent, carry out development for any purpose on land to which this clause applies until the land is acquired or developed for the purpose for which it is zoned.**

##### **(6) A person must not carry out development on land to which this clause applies prior to its acquisition so as to render the land unfit for the purposes for which it is zoned.**

##### **(7) Consent referred to in subclause (5) must not be granted unless consideration has been given to:**

*(a) the need for the proposed development on the land, and*

*(b) the impact of the proposed development on the existing or likely future use of the land, and*

*(c) the need to retain the land for its existing or likely future use, and*

*(d) the effect of the proposed development on the costs of acquisition, and*

*(e) the imminence of acquisition, if the land has not yet been acquired, and*

*(f) the costs of reinstatement of the land for the purposes for which the land is to be acquired.*

##### **(8) In granting such a consent, the consent authority may impose conditions requiring:**

*(a) the removal of any building or work for which the consent is being granted, and*

*(b) the reinstatement of the land or removal of any waste materials, refuse or contaminants, without the payment of compensation by the consent authority.*

This clause and the range of development prohibited by the zoning make additional development controls for high flow open space areas unnecessary.

Ultimately Council is likely to acquire all of the remaining privately owned 6(a) zoned land in South Murwillumbah.

**Table 2.5 - Options for Development Controls for High Flow Areas**

| Zoning                       | Option 1   | Option 2   | Option 2 Assessment   | Option 3   | Option 3 Assessment  | Option 4 | Option 4 Assessment |
|------------------------------|--|--|---|--|--|----------|---------------------|
| 1(b) Agricultural            | Exclude all new development from the mapped high flow areas  | Exclude all new residential development from the mapped high flow areas. Other development only permissible within high flow areas if the development will not change ground levels by more than 300mm (for local drainage purposes) or obstruct flood flows. Examples of permissible development include:<br><ul style="list-style-type: none"> <li>buildings with footprints less than 80m<sup>2</sup>, and</li> <li>separated from other structures by no less than 30m;</li> <li>levees, bunds, or road formations no more than 300mm above natural ground level;</li> <li>wire strand fencing.</li> </ul> | Allows provision of public and agricultural infrastructure and service structures across the floodplain. On large lots, will often be able to locate dwellings and significant structures outside of high flow areas. Where this is not possible, exclusion of new dwellings from high flow areas may conflict with existing use rights, dwelling entitlements and be challenged by landholders. Obstruction of high flow flows minimised by maximum footprint and separation distances for large structures. | As per Option 2, but permit new residential development within the mapped high flow areas only if total enclosure below the design flood level is less than 50m <sup>2</sup> .   | Allows landholders to exercise dwelling entitlements. Permitting new dwellings in high flow areas increases risk of property damage and loss of life. Cumulative impact of new dwellings on flooding is minimised, as is potential for habitable uses below the flood planning level.  |          |                     |
| 1(a) Rural                   | Exclude all new development from the mapped high flow areas.   | Sterilises large areas of the rural floodplain from development. May prevent future diversification of agricultural industry. May limit provision of infrastructure. Provides maximum preservation of high flow areas.   | Allows provision of public and agricultural infrastructure and service structures across the floodplain. On large lots, will often be able to locate dwellings and significant structures outside of high flow areas. Where this is not possible, exclusion of new dwellings from high flow areas may conflict with dwelling entitlements and be challenged by landholders. Obstruction of high flow flows minimised by maximum footprint and separation distances for large structures.                      | As per Option 2, but permit new residential development (except for housing for older people or people with disabilities) within the mapped high flow areas only if total enclosure below the design flood level is less than 50m <sup>2</sup> . | Allows landholders to exercise dwelling entitlements. Permitting new dwellings in high flow areas increases risk of property damage and loss of life. Cumulative impact of new dwellings on flooding is minimised, as is potential for habitable uses below the flood planning level. Exclusion of aged housing reflects unmanageable risk to invalid or disabled residents on high flow floodplain. |          |                     |
| 2(a) Low density residential | No new dwellings permitted in mapped high flow areas. No improvements requiring development consent permitted on existing residences within the high flow areas. | Provides maximum protection to high flow areas. Residents lose entitlements to improve their land and are likely to seek compensation. May be challenged due to accuracy of high flow mapping and difficulties in ground truthing.   | Allows owners to improve their land without imposing significant restrictions to flood flows. No increase in potential flood damages up to design flood. May be challenged due to accuracy of high flow mapping and difficulties in ground truthing.  | Permit residential redevelopment within the mapped high flow areas provided total enclosure below design flood level is less than 50m <sup>2</sup> .   | Maintains status quo. Allows owners to improve their land, with limited adverse cumulative impacts of residential development on flowpath capacity. Increased exposure to flood damages, but unauthorised habitable usage is limited. Known to be difficult to enforce. Same controls as low flow land so equitable.   |          |                     |

| Zoning   | Option 1  | Option 1 Assessment   | Option 2   | Option 2 Assessment  | Option 3   | Option 3 Assessment   | Option 4   | Option 4 Assessment  |
|--|---|---|--|--|--|---|--|--|
| 3(c) & 3(d) Business (Commerce and Trade, Waterfront Enterprise) | No development permissible in mapped high flow areas.   | Sterilises significant areas of land zoned for waterfront development. Provides maximum preservation of high flow areas. Owners of land may seek compensation for loss of development entitlements. | Only permit development that will not alter ground levels or provide obstructions to flood flow, including buildings and fencing, within the mapped high flow areas. | Allows landholders to make use of land (eg. carparking), but permissible development severely restricted, as are likely financial returns. Minimal flood impact on locality. | Development only permissible within high flows areas if the development will not change ground levels by more than 300mm (for local drainage purposes) or obstruct flood flows. Examples of permissible developments include: <ul style="list-style-type: none"> <li>· buildings with footprints less than 50m2, and separated from other structures by no less than 6m;</li> <li>· levees, bunds, or road formations no more than 300mm above natural ground level;</li> <li>· permeable fencing (minimum 90% void space).</li> </ul> | Allows landholders to make wider use of land than Option 2, but typical shop front type development still unfeasible. Cumulative impact of new development on flooding is minimised, as is potential for habitable uses below the flood planning level. | Permit development in mapped high flow areas, subject to maximum 50% site coverage for buildings and other obstructions to flow on each lot. At least 50% of any cross section for each lot, transverse to the direction of flood flow, must be preserved clear of flow obstructions down to natural ground level. Fencing must be permeable to allow the passage of flood flows (minimum 90% void space), or be collapsible under flood flow (eg. timber palings).  | Permits landholders to make wider use of land than Option 3, and makes commercial and retail land use more feasible. Additional development likely to have some adverse impact on flood conditions in the locality, but this is limited by relatively small high flow areas within this zone.  |
| 4(a) Industrial  | No development permissible in mapped high flow areas.   | Landholders lose development entitlement for land zoned by Council for industrial uses and may seek compensation. Provides maximum protection to high flow areas.                                   | Only permit development that will not alter ground levels or provide obstructions to flood flow, including buildings and fencing, within the mapped high flow areas. | Allows landholders to make use of land (eg. carparking), but permissible development severely restricted, as are likely financial returns. Minimal flood impact on locality. | Development only permissible within high flows areas if the development will not change ground levels by more than 300mm (for local drainage purposes) or obstruct flood flows. Examples of permissible developments include: <ul style="list-style-type: none"> <li>· buildings with footprints less than 50m2, and separated from other structures by no less than 6m;</li> <li>· levees, bunds, or road formations no more than 300mm above natural ground level;</li> <li>· permeable fencing (minimum 90% void space).</li> </ul> | Allows landholders to make wider use of land than Option 2, but typical industrial shed development still unfeasible. Obstruction of high flood flows minimised by maximum footprint and separation distances for large structures.                     | Exclude all development from Lot 4 DP 591604. Permit development in all remaining mapped high flow areas, subject to maximum fill height to ARI 20 year flood level, and maximum 50% site coverage for buildings and other obstructions to flow. At least 50% of any cross section for each lot, transverse to the direction of flood flow, must be preserved clear of flow obstructions above the ARI 20 year flood level. Fencing must be permeable to allow the passage of flood flows (minimum 90% void space), or be collapsible under flood flow (eg. timber palings). | Protects main outlet for flood basin. Landholder of Lot 4 loses development entitlements for industrial zoned land and may seek compensation. Remaining landholders are able to develop their land to similar extent to existing industrial areas in South Murwillumbah and Chinderah, while minimising flow impacts on major floods. Additional development likely to have some adverse impact on flood conditions in the locality, but this is limited by the relatively small high flow areas within this zone. |
| 5(a) Special Uses (School)                                       | Permit development in mapped high flow areas, subject to maximum 50% site coverage for buildings and other obstructions to flow on each lot. At least 50% of any cross section for each lot, transverse to the direction of flood flow, must be preserved clear of flow obstructions down to natural ground level. Fencing must be permeable to allow the passage of flood flows (minimum 90% void space), or be collapsible under flood flow (eg. timber palings). | Enables typical scale of development for this zone and use, while minimizing potential flooding impacts   |  |  |  |   |  |  |

## 2.6 Preferred Development Control Options

Based on assessment of the options in Table 2.5 above, the following development controls are nominated as the preferred options for mapped high flow areas of the floodplain:

- (i) 1(a) Rural and 1(b) Agricultural zoned land - Option 2  
Exclude all new residential development from the mapped high flow areas. Other development only permissible within high flows areas if the development will not change ground levels by more than 300mm (for local drainage purposes) or obstruct flood flows. Examples of permissible development include:
  - buildings with footprints less than 80m<sup>2</sup>, and separated from other structures by no less than 30m;
  - levees, bunds, or road formations no more than 300mm above natural ground level;
  - wire strand fencing.
- (ii) 2(a) Low Density Residential zoned land - Option 3  
Permit residential redevelopment within the mapped high flow areas provided total enclosure below design flood level is less than 50m<sup>2</sup>.
- (iii) 3(c) & 3(d) Business (Commerce and Trade and Waterfront Enterprise) zoned land - Option 4  
Permit development in mapped high flow areas, subject to maximum 50% site coverage for buildings and other obstructions to flow on each lot. At least 50% of any cross section for each lot, transverse to the direction of flood flow, must be preserved clear of flow obstructions down to natural ground level. Fencing must be permeable to allow the passage of flood flows (minimum 90% void space), or be collapsible under flood flow (eg. timber palings).
- (iv) 4(a) Industrial zoned land - Option 4  
Exclude all development from Lot 4 DP 591604. Permit development in all remaining mapped high flow areas, subject to maximum fill height to ARI 20 year flood level, and maximum 50% site coverage for buildings and other obstructions to flow. At least 50% of any cross section for each lot, transverse to the direction of flood flow, must be preserved clear of flow obstructions above the ARI 20 year flood level. Fencing must be permeable to allow the passage of flood flows (minimum 90% void space), or be collapsible under flood flow (eg. timber palings).
- (v) 5(a) Special Uses (School) zoned land - Option 1  
Permit development in mapped high flow areas, subject to maximum 50% site coverage for buildings and other obstructions to flow on each lot. At least 50% of any cross section for each lot, transverse to the direction of flood flow, must be preserved clear of flow obstructions down to natural ground level. Fencing must be permeable to allow the passage of flood flows (minimum 90% void space), or be collapsible under flood flow (eg. timber palings).

## **2.7 Mitigation and Management Measures for High Flow Areas**

This study does not propose any options for structural works to alter existing high flow flood behaviour, nor does it propose any options for land acquisition or voluntary purchase of affected land.

The only area in the Tweed Valley where such a study has been previously undertaken is Murwillumbah. The Murwillumbah Floodplain Management Plan (1989) included within its recommendations the raising of the Murwillumbah Town Levee and the introduction of a voluntary purchase scheme in South Murwillumbah. While the levee works have been completed, the voluntary purchase scheme is still in effect in a limited high flow area of South Murwillumbah.

The Tweed Valley Flood Study 2005 provides a better understanding of high flood flow areas in Murwillumbah and surrounding localities, and the development controls proposed by this study warrants further consideration of such measures. As such, a recommendation of this study will be to undertake, as a separate Part of the Tweed Valley Floodplain Risk Management Study, a review of the Murwillumbah Floodplain Management Plan.

Similar flood mitigation and management measures for other localities will need to be considered in separate Part(s) of the Tweed Valley Floodplain Risk Management Study, to develop new Floodplain Risk Management Plans.

## **2.8 Other Planning Controls**

### **2.8.1 Tweed Local Environment Plan 2000**

As noted previously, the current objectives of the LEP in relation to flooding are to protect the community from hazards and damage associated with flooding. The LEP does not have a specific objective of preserving the hydraulic properties of the floodplain from development.

On 31 March 2006, the NSW Department of Planning gazetted the Standard Instrument (Local Government Plans) Order 2006. The Order prescribes a standard form and content for Council's LEP. Draft LEP amendments will therefore be required to be prepared in accordance with the standard instrument and incorporate the relevant mandatory provisions before they can be publicly exhibited or recommended for gazettal. The process for the preparation of a Draft LEP in accordance with the standard instrument is outside the scope of this study, and will be undertaken by Council in due course.

It is a recommendation of this study, however, that development of flood liable land be considered in this future amendment. There are no standard provisions prescribed by the Order that relate to development of flood liable land, or the more specific objectives of this study to preserve high flow areas of the floodplain from impacting development.

The Department of Planning's Planning Circular of 3 April 2006 (PS 06-008) states that Council may prepare local provisions to address matters that are relevant to their local area and which are not covered by provisions in the standard instrument. These issues must be the subject of State or regional planning guidance requiring councils to develop tailored provisions that are appropriate to their local area. The example provided is the development of flood planning provisions using the NSW Government's Floodplain Development Manual.

The following clause in relation to flood liable (flood prone) land, taken from the Department of Planning's Draft Standard Local Environment Plan (September 2005) is considered an appropriate basis for a future clause in a Draft LEP amendment:

**53 Development on flood prone land [compulsory if land to which plan applies contains flood prone land]**

*(1) The objectives of this clause are:*

- (a) to maintain the existing flood regime and flow conveyance capacity, and*
- (b) to enable safe occupation of flood prone land, and*
- (c) to avoid significant adverse impacts upon flood behaviour, and*
- (d) to avoid significant adverse affects on the floodplain environment that would cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of the river bank/watercourse, and*
- (e) to limit uses to those compatible with flow conveyance function and flood hazard.*

*(2) This clause applies to land shown as flood prone land on the [Name of local government area] Flood Prone Land Map.*

*(3) Development consent is required for the following:*

- (a) subdivision of land,*
- (b) filling and earthworks,*
- (c) the erection of a building,*
- (d) the carrying out of a work,*
- (e) flood mitigation works, on land to which this clause applies.*

*(4) Consent required by subclause (3) must not be granted unless the consent authority is satisfied that the development:*

- (a) will not adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and*
- (b) will not significantly alter flow distributions and velocities to the detriment of other properties or the environment of the floodplain, and*
- (c) will enable safe occupation of the flood prone land, and*
- (d) will not significantly detrimentally affect the floodplain environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of the riverbank/watercourse, and*
- (e) will not be likely to result in unsustainable social and economic costs to the flood affected community or general community, as a consequence of flooding, and*
- (f) is compatible with the flow conveyance function of the floodway, and*
- (g) is compatible with the flood hazard within the floodway.*

## 2.9 Recommended Preferred Options for the Tweed Valley Floodplain Risk Management Study 2005

### Part 2 – Planning Controls for High Flow Areas

Based on assessment of the options it is recommended that:

(a) The following development controls be applied to future development in mapped high flow areas of the floodplain:

- (i) 1(a) Rural and 1(b) Agricultural zoned land - Exclude all new residential development from the mapped high flow areas. Other development only permissible within high flows areas if the development will not change ground levels by more than 300mm (for local drainage purposes) or obstruct flood flows. Examples of permissible development include:
  - buildings with footprints less than 80m<sup>2</sup>, and separated from other structures by no less than 30m;
  - levees, bunds, or road formations no more than 300mm above natural ground level;
  - wire strand fencing.
- (ii) 2(a) Low Density Residential zoned land - Permit residential redevelopment within the mapped high flow areas provided total enclosure below design flood level is less than 50m<sup>2</sup>.
- (iii) 3(c) & 3(d) Business (Commerce and Trade and Waterfront Enterprise) zoned land - Permit development in mapped high flow areas, subject to maximum 50% site coverage for buildings and other obstructions to flow on each lot. At least 50% of any cross section for each lot, transverse to the direction of flood flow, must be preserved clear of flow obstructions down to natural ground level. Fencing must be permeable to allow the passage of flood flows (minimum 90% void space), or be collapsible under flood flow (eg. timber palings).
- (iv) 4(a) Industrial zoned land - Exclude all development from Lot 4 DP 591604. Permit development in all remaining mapped high flow areas, subject to maximum fill height to ARI 20 year flood level, and maximum 50% site coverage for buildings and other obstructions to flow. At least 50% of any cross section for each lot, transverse to the direction of flood flow, must be preserved clear of flow obstructions above the ARI 20 year flood level. Fencing must be permeable to allow the passage of flood flows (minimum 90% void space), or be collapsible under flood flow (eg. timber palings).
- (v) 5(a) Special Uses (School) zoned land - Permit development in mapped high flow areas, subject to maximum 50% site coverage for buildings and other obstructions to flow on each lot. At least 50% of any cross section for each lot, transverse to the direction of flood flow, must be preserved clear of flow obstructions down to natural ground

level. Fencing must be permeable to allow the passage of flood flows (minimum 90% void space), or be collapsible under flood flow (eg. timber palings).

(b) A review of the Murwillumbah Floodplain Management Plan be undertaken, as a separate Part of the Tweed Valley Floodplain Risk Management Study.

(c) Local provisions relating to the development of flood liable land, and specifically the objective of protecting the natural hydraulic properties of the floodplain from impacting development, be included in a future draft LEP amendment, prepared in accordance with the Standard Instrument (Local Environment Plans) Order 2006.

### **2.10 Draft Part 2 of the Tweed Valley Floodplain Risk Management Plan 2005 – Planning Controls for High Flow Areas**

The draft Part 2 Plan is appended as Annexure A

## Annexure A

### Draft Part 2 of the Tweed Valley Floodplain Risk Management Plan 2005 – Planning Controls for High Flow Areas

#### 1. Objectives

- Adopt development controls for high flow areas of the floodplain that are recommended by Part 2 of the Tweed Valley Floodplain Risk Management Study 2005, to minimise the cumulative impacts of developments that have the potential to restrict flood flows and adversely impact on the flooding of other properties.
- Identify appropriate implementation measures.

#### 2. Planning Controls for High Flow Areas

(a) The following development controls shall be applied to future development in mapped high flow areas of the floodplain:

- (i) 1(a) Rural and 1(b) Agricultural zoned land - Exclude all new residential development from the mapped high flow areas. Other development only permissible within high flows areas if the development will not change ground levels by more than 300mm (for local drainage purposes) or obstruct flood flows. Examples of permissible development include:
  - buildings with footprints less than 80m<sup>2</sup>, and separated from other structures by no less than 30m;
  - levees, bunds, or road formations no more than 300mm above natural ground level;
  - wire strand fencing.
- (ii) 2(a) Low Density Residential zoned land - Permit residential redevelopment within the mapped high flow areas provided total enclosure below design flood level is less than 50m<sup>2</sup>
- (iii) 3(c) & 3(d) Business (Commerce and Trade and Waterfront Enterprise) zoned land - Permit development in mapped high flow areas, subject to maximum 50% site coverage for buildings and other obstructions to flow on each lot. At least 50% of any cross section for each lot, transverse to the direction of flood flow, must be preserved clear of flow obstructions down to natural ground level. Fencing must be permeable to allow the passage of flood flows (minimum 90% void space), or be collapsible under flood flow (eg. timber palings).
- (iv) 4(a) Industrial zoned land - Exclude all development from Lot 4 DP 591604. Permit development in all remaining mapped high flow areas, subject to maximum fill height to ARI 20 year flood level, and maximum 50% site coverage for buildings and other obstructions to flow. At least 50% of any cross section for each lot, transverse to the direction of

flood flow, must be preserved clear of flow obstructions above the ARI 20 year flood level. Fencing must be permeable to allow the passage of flood flows (minimum 90% void space), or be collapsible under flood flow (eg. timber palings).

- (v) 5(a) Special Uses (School) zoned land - Permit development in mapped high flow areas, subject to maximum 50% site coverage for buildings and other obstructions to flow on each lot. At least 50% of any cross section for each lot, transverse to the direction of flood flow, must be preserved clear of flow obstructions down to natural ground level. Fencing must be permeable to allow the passage of flood flows (minimum 90% void space), or be collapsible under flood flow (eg. timber palings).

(b) Undertake, as a separate Part of the Tweed Valley Floodplain Risk Management Study, a review of the Murwillumbah Floodplain Management Plan.

(c) Include local provisions relating to the development of flood liable land, and specifically the objective of protecting the natural hydraulic properties of the floodplain from impacting development, in a future draft LEP amendment, prepared in accordance with the Standard Instrument (Local Environment Plans) Order 2006.

### **3. Implementation**

(a) The development controls should be implemented by an amendment to Development Control Plan No.5 Development of Flood Liable Land. Draft Version 2.4 of DCP5 incorporating these amendments will be publicly exhibited in accordance with Clause 18 of the Environmental Planning and Assessment Regulation 2000.

(b) A review of the Murwillumbah Floodplain Management Plan will be included in forward planning for the Tweed Valley Floodplain Risk Management Study.

(c) The preparation of a draft LEP amendment, in accordance with the Standard Instrument (Local Environment Plans) Order 2006, including local provisions relating to development of flood liable land, will be tasked to Council's Strategic Planning Unit.

## **Annexure B**

### **Tweed Valley Floodplain - High Flow Areas**