

Managing Floodplain Development with Improved Planning Controls

Paul Grech, Director, Don Fox Planning Pty Limited
Drew Bewsher, Director, Bewsher Consulting Pty Limited

Summary: Improved planning controls are often the most significant measure within floodplain management plans. These controls must be developed within a comprehensive planning study if the intent of the Government's Floodplain Development Manual is to be followed. To date, the development of appropriate planning controls within floodplain management studies and plans has been hampered by reliance on a designated flood, which has unfortunately focussed attention on a single flood (usually the 100 year flood). Controls have also failed to comprehensively consider the varying land uses and flood risks on the floodplain.

A new approach to developing controls is presented in the paper based on work carried out as part of the Blacktown Floodplain Management Study. The approach provides controls within seven major categories (floor level, building components, structural soundness, flood impact on others, evacuation/access, flood awareness, and management and design), and allows these controls to vary with land use and flood risk. The resultant controls are summarised in a planning control matrix.

The authors have successfully applied the approach to a number of floodplains and believe the approach is flexible and suitable for use as a model for most floodplains. Use of the approach will assist in integrating floodplain management within the planning activities of local government.

1. INTRODUCTION

Those involved directly with floodplain management studies in recent years will have noted an increasing emphasis to seek non-structural solutions to floodplain management – in particular, the use of town planning controls. The majority of people involved in floodplain management studies are engineers, who will eventually rely on town planners to produce and implement such controls.

Anecdotal evidence and observations suggest that town planners (in Councils or State Government) are often indifferent, not interested or have a narrow view of what town planning can contribute to floodplain management. This has led to a relatively standardised town planning input to floodplain management when it is inevitable that each floodplain exhibits different characteristics and problems which by necessity need to be addressed on an individual basis. Indeed, the Floodplain Development Manual (Reference 1) and the much talked about Floodplain Management Manual, are aimed at encouraging a comprehensive analysis of floodplains having regard to their broader land use, social, economic and ecological characteristics to produce responsive, individually tailored Floodplain Management Plans.

This paper discusses a new approach to the development of planning controls for floodplains. The approach was initially an outcome of the Blacktown Floodplain Management Study (FPMS) (Reference 2) in respect to the Eastern Creek sub-catchment of the Hawkesbury-Nepean catchment located within the Blacktown local government area. The approach was developed by the authors in consultation with the Department of Land and Water Conservation (and some councils).

The Blacktown FPMS examined the broad ambit of issues relative to the whole of the floodplain (i.e. up to and including the maximum probable flood (PMF)) and assessed the

implications of alternative land uses in the context of alternative building and management controls, within different sections of the floodplain. The results of the assessment indicated that it would not be appropriate to adopt a single designated flood (i.e. flood standard), which would effectively limit the planning controls to a narrowed section of the floodplain. Accordingly, a set of planning controls was developed which provided a transitional level of control based on the frequency of inundation and the sensitivity of the possible range of land uses to the flood risk.

This paper addresses how this new approach has emerged having regard to the increasing role of town planning in floodplain management, the potential controls that exist in the armoury of the town planner, the principal controls required to achieve the implementation of the new approach, and how these differ from the traditional approach.

2. THE ROLE OF TOWN PLANNING IN FLOODPLAIN MANAGEMENT

Town planners are trained to undertake planning studies and to consider flooding (normally as a constraint to development) when doing so. So it is with little surprise that planners are indifferent when an engineer, having completed hydrological modelling, comes to them and says “here, please prepare some planning controls”. This is not the way that planners are trained to deal with the issue of flooding.

The Floodplain Development Manual (Reference 1) requires the consideration of broader issues so that relevant authorities can make decisions about the management of the floodplain by balancing concerns of flood risk against ecological, social, economic and other considerations associated with the efficient utilisation of the land. The Manual states at page 67:

“The formulation of a Floodplain Management Plan (FMP) involves the consideration of various options for development and mitigation together with an assessment of their consequences. Both adverse and favourable impacts have to be considered with respect to flood-related issues as well as to social, economic and ecological issues”

This basically means that a planning study of sorts needs to be undertaken to prepare a Floodplain Management Plan (FMP) which accords with this accepted approach. That is, the FMP should take into consideration the diverse range of planning issues (ecological, social, economic, etc.) inclusive of the flood risk, to determine the most appropriate use and management option for the floodplain. This is the typical approach for planning studies with the only difference being that the FMP is a study focused on a floodplain, with the primary goal to address the issue of flooding.

This does not mean a full planning study of an area is required as often such documentation is available but needs to be reviewed so that the planning context is clear when considering the appropriate planning response to the flooding issue.

Such an approach should lead to planning controls which vary with the flood risk and the range of potential land uses which may occur in the floodplain. However, this does not normally happen as the historical approach generally treats all land uses the same and narrows controls to a section of the floodplain (normally the 100 year floodplain).

3. WHAT POTENTIAL CONTROLS EXIST IN THE ARMOURY OF THE TOWN PLANNER IN NSW?

It has been recognised (Reference 3) that planning measures provide the greatest opportunity to control and limit any increase in the future risk and damage in the floodplain. Planning measures are a long term proposition that should be directed to long term time frames. The planning horizon may extend from 1 to 100 years or more to identify and realise opportunities for correcting historical problems (e.g. improving accessibility of evacuation routes, changing land uses, changing the form of existing development, or voluntary property acquisitions in especially hazardous areas).

Apart from establishing the basis for property acquisitions, planning is generally only involved in the management and development of the floodplain in response to the consideration of development proposals as they arise. Accordingly, by its nature planning may have an ad hoc and slow implementation, although constantly progressing towards the desired end. The rate of implementation will be proportional to the rate of development activity which in turn is reflected in the incoming rate of applications for development and building proposals.

There are presently a number of mechanisms within current statutes in NSW which provide a requirement for Council to take into consideration the issue of flooding in the preparation of specific types of planning instruments and the subsequent assessment of individual development and building proposals. These include the following:

The provisions of the **Environmental Planning and Assessment Act 1979** (EPA Act) including its specific aims and objectives: Section 90(1)(g) of the Act which requires flooding to be taken into consideration in the determination of development applications and Section 117(2) Ministerial Directions (relevant to the preparation of environmental planning instruments) which include matters relevant to floodplains.

Environmental Planning Instruments, in particular **Local Environmental Plans** (LEP's) prepared under the EPA Act. The major contributions provided by an LEP include recognition of the designated flood (if proposed) the delineation of major flood hazard areas within special related zones where most development is prohibited, and the establishment of objectives and general guidelines.

Councils' **Development Control Plans (DCP'S)** prepared under the EPA Act, which may provide detail and comprehensive guidelines for the assessment of development applications covering the typical issues of floor levels, site compatible materials, structural soundness, affect on others, evacuation, flood awareness and management.

The **Local Government Act 1993 (Approvals) Regulation** with Clause 12.1 requiring flooding to be a matter taken into consideration in the determination of building applications and Clause 15 requiring Councils to consider the Floodplain Development Manual in determining applications for movable dwellings.

C Any **Local Approvals Policy (LAP)** adopted by Council under the Local Government Act 1993, is to be considered in the determination of building applications. This would provide the potential for a range of controls similar to a DCP, but would apply in regard to building applications.

Section 94 Contributions Plans which provide a basis for the levying of developer contributions to contribute to drainage and flood mitigation works required as a result of future development. Section 94 contributions can only be utilised to fund drainage and flood mitigation works associated with new development, and cannot be applied for the purposes of rectifying past inadequacies.

With regard to floodplain management, the critical planning instruments in NSW are a combination of the LEP and DCP/LAP. In the majority of cases these planning instruments should be issued as a package, as the legislation and practice creates limits to the controls applicable under each instrument.

4. HOW CAN THE LEP AND DCP/LAP BE APPLIED TO ACHIEVE EFFECTIVE FLOODPLAIN MANAGEMENT?

This section of the paper discusses how a package of planning

controls embodied within an LEP and DCP/LAP can be applied to achieve effective floodplain management. The Blacktown FPMS (Reference 2) will be used as a case study.

4.1 The Blacktown Floodplain Management Study

In general the majority of the existing urban areas of Blacktown are located in the southern half of the study area between the M4 western motorway in the south and the proposed Castlereagh Freeway Reservation in the north. The northern half of the study area is substantially rural, although containing the township of Riverstone and a number of major land uses. These include Australia’s Wonderland, the Western Sydney Area Recreation Area, the Nirimba Education Precinct, and the major area of future urban development in the local government

Accordingly, the overall floodplain (up to the PMF) encompasses a large area, and extends much further than the 100 year floodplain. **Figure 1** provide a summary of the total potentially affected development within the Eastern Creek North precinct for a range of flood events.

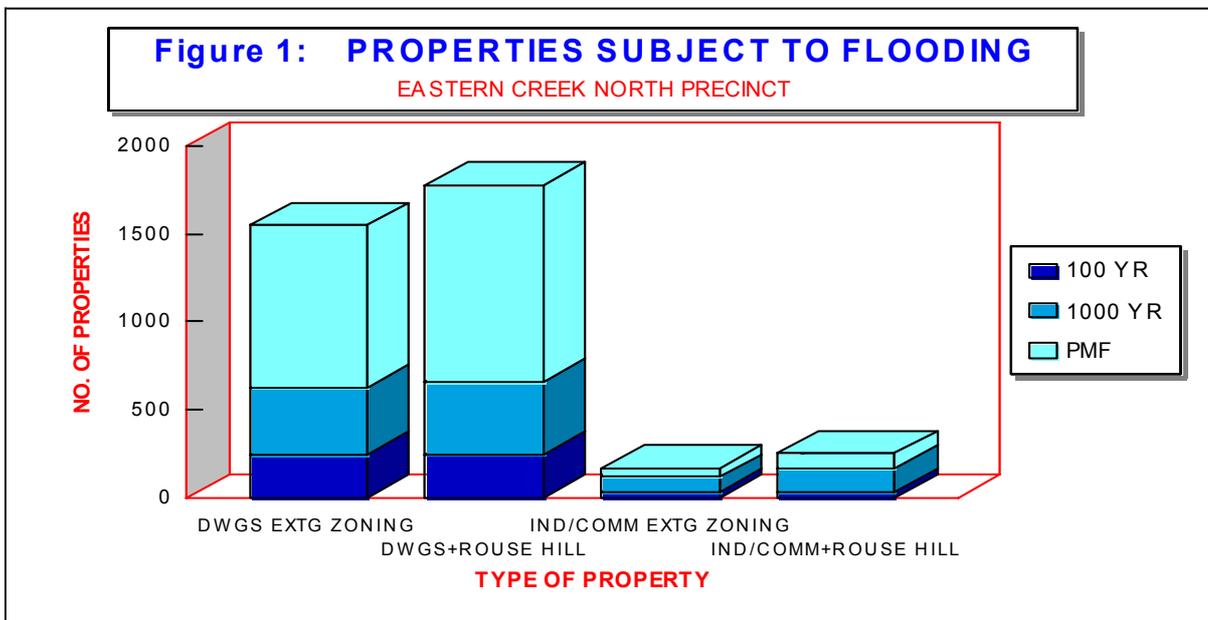
As planning within the Eastern Creek North precinct is substantially impacted by future development associated with the Rouse Hill release area, Figure 1 outlines the potential affectation assuming additional development occurs associated with the release of land within the Rouse Hill area. The assessment reveals that there is minimal additional development potential associated with further land releases in the Rouse Hill area which would be situated in the PMF floodplain. However, the above graph reveals that there are a substantial number of existing and potential residential and industrial/commercial properties provided for by existing zonings which are affected by floods greater than the 100 year

area centred around the possible Stage 2 Rouse Hill Release Area.

The Blacktown FPMS examined the full range of issues associated with development in the overall floodplain (up to the PMF) and the implications associated with the flood risk within different sections of the floodplain. The results of the assessment highlighted the need to review the appropriateness of the traditional 100 year standard, particularly for the Eastern Creek north precinct due to significant variations between the 100 year and PMF floods. The order of difference is some five times the normal distance and flood height that can be expected in similar terrain, that is, up to 1 kilometre in distance and 11 metres in height between the 100 year and PMF floods.

event. Only 16% of properties affected by floods up to the PMF event are within the 100 year floodplain.

This assessment, together with other factors investigated, indicated a need to provide for planning controls relative to the PMF floodplain but there was no convincing argument to apply a singular designated flood to equally apply to all land uses within the same area of the floodplain. The overall floodplain management study showed that there was a transition of sensitivity to the flood risk across a range of potential land uses and the nature of predicted floods within the PMF floodplain. From this evolved the need to have a set of planning controls which did not rely on one particular designated flood applicable to all land use types. The resultant recommended planning controls which satisfy this objective are manifested in the form of a LEP and DCP/LAP. The role of both these documents is described below.



4.2 Development Control Plans/Local Approvals Policy (DCP/LAP)

A Development Control Plan (DCP) is a plan prepared in accordance with Section 72 of the Environmental Planning Assessment Act that provides detailed guidelines for the assessment of development applications. A DCP provides more detailed planning controls that supplement the provisions of the LEP. A Local Approvals Policy (LAP) is a policy prepared in accordance with the provisions of the Local Government Act 1993 that provides guidelines in the assessment of Building Applications. The DCP/LAP provides a means to ensure that where development is permissible in a floodplain, appropriate controls can be applied to ensure that it can occur with minimal additional risk to life and property.

It was considered that the controls appropriate for development within the floodplain would be equally applicable to development requiring either a Building Application or Development Application. Accordingly, it was proposed that the DCP be prepared in a format which could be suitably adopted as a LAP as well as a DCP. This also addressed any inconsistencies in the consideration of applications which may be for similar development but because of zone boundaries may sometimes only require a building application rather than both a development application and building application. This combined approach is also consistent with the State Government's current white paper and draft bill for the amendment of the Environmental Planning Assessment Act, 1979, which attempts to combine the building and development application processes.

A DCP/LAP was prepared to form a component of the Blacktown FPMS. The DCP/LAP format was consistent with modern DCP's and included standard sections dealing with the application of the policy, aims and objectives, definitions and general controls. The DCP/LAP was structured to provide for a transitional set of development controls relative to the sensitivity of land uses to the flood risk associated with a range of predicted floods.

Table 1 is an example of the planning control matrix which provides a summary of the controls recommended within the DCP/LAP. The following is an explanation of the major elements of the controls proposed.

4.3 Applicable Areas

The flood risk and consequent range of controls were considered to be different for the two distinct north and south precincts of the floodplain. That area north of the proposed Castlereagh Freeway Reservation (North Precinct) was subject to significant flooding associated with floods in the Hawkesbury Nepean system, while the area south of the proposed Castlereagh Freeway Reservation (South Precinct) was not. Accordingly, these areas were treated separately in regard to the segregation of the floodplain and development controls.

4.4 Flood Categories

Four flood categories were identified for the North Precinct, being the Highest Historical Flood (HHF) to PMF, the 100 year flood to the HHF, up to the 100 year flood and outside the

floodway, and up to the 100 year flood and within the floodway.

Within the Southern Precinct, three flood categories were chosen being the 100 year flood to the PMF, up to the 100 year flood and outside the floodway, and up to the 100 year and within the floodway.

4.5 Land Use Categories

Generally all potential land uses or development types are captured by the various land use definitions contained within an LEP. All relevant definitions within Blacktown LEP 1988 were identified and attached to one of the following seven land use categories.

- . Essential community services
- . Critical utilities
- . Subdivision and filling
- . Residential
- . Commercial or industrial
- . Recreation or agriculture
- . Minor development

The definitions contained with the LEP were sometimes qualified to fit the context of the flood related DCP/LAP. For example, minor development in the case of residential development referred to additions and extensions of a particular size.

The land use categories were formulated to reflect an increased sensitivity to the flood risk from one category to the next. All land uses within the same category were considered to have similar sensitivity to the flood risk.

4.6 Development Controls

The following seven major categories of development control were identified:-

- . Floor level
- . Building components
- . Structural soundness
- . Flood affect on others
- . Evacuation/access
- . Flood awareness
- . Management and design

Within each of these categories, alternate development controls were specified having regard to the findings of the FPMS. These development controls were then assigned to the alternate land uses within each of the flood risk categories.

4.7 Local Environmental Plan (LEP)

A Local Environmental Plan (LEP) is a plan prepared in accordance with the Environmental Planning & Assessment Act, 1979, which defines zones, permissible uses within those zones, general aims and zone objectives, specific development standards and other special matters for consideration with regard to use or development of land. The study area was subject to the provisions of Blacktown LEP, 1988.

TABLE 1: PLANNING CONTROLS MATRIX (from Blacktown Floodplain Management Study)

AREA	GROUND LEVEL OF LAND																									
	>HHF TO PMF				>1 IN 100YR TO HHF				UP TO & INCL 1IN 100YR FLOOD AND OUTSIDE FLOODWAY				UP TO & INCL 1IN 100YR FLOOD AND WITHIN FLOODWAY													
SOUTH OF PROPOSED CASTLEREAGH FREEWAY RESERVATION	100 YR TO PMF				NOT APPLICABLE				UP TO & INCL 1IN 100YR FLOOD AND OUTSIDE FLOODWAY				UP TO & INCL 1IN 100YR FLOOD AND WITHIN FLOODWAY													
	ESSENTIAL COMM FACILITIES	CRITICAL UTILITIES	SUBDIVISION & FILLING	RESIDENTIAL	COMMERCIAL OR IND	REC OR AGRIC	MINOR DEVELOPMENT	ESSENTIAL COMM FACILITIES	CRITICAL UTILITIES	SUBDIVISION & FILLING	RESIDENTIAL	COMMERCIAL OR IND	REC OR AGRIC	MINOR DEVELOPMENT	ESSENTIAL COMM FACILITIES	CRITICAL UTILITIES	SUBDIVISION & FILLING	RESIDENTIAL	COMMERCIAL OR IND	REC OR AGRIC	MINOR DEVELOPMENT					
FLOOR LEVEL	4	3						3		2	2			5			2	2	1	5			1	5		
BUILDING COMPONENTS	3	3						3		2	2						2	2	1	1			1	1		
STRUCTURAL SOUNDNESS	4	4						4	5	3	3						5	3	3	2	2			1	1	
FLOOD AFFECTATION								2	2	2	2						1	2	2	2	2			1	1	
EVACUATION/ACCESS	2	4						4	4	4	4						1,4	4	3,4	4				4	4	
FLOOD AWARENESS	3	3	1,3	3	3	3	3		3	1,3	3	3	3	3			1,2,3	2,3	2,3	2,3	2,3				2,3	2,3
MANAGEMENT & DESIGN	1	1						1	4								4	1,2,3	1,2,3	1,2,3	1,3				1,2,3	1,2,3

NOTES

-  NOT RELEVANT
-  UNSUITABLE LAND USE

-  HHF REFERS TO THE HIGHEST HISTORICAL FLOOD AS DEFINED IN THE GLOSSARY
-  PMF REFERS TO THE PROBABLE MAXIMUM FLOOD AS DEFINED IN THE GLOSSARY

FLOOR LEVEL

- 1 ALL FLOOR LEVELS TO BE EQUAL TO OR GREATER THAN THE 1 IN 5 YEAR FLOOD PLUS 0.5M (FREEBOARD)
- 2 HABITABLE FLOOR LEVELS TO BE EQUAL TO OR GREATER THAN THE 1IN 100YR FLOOD PLUS 0.8M (FREEBOARD) AND OTHER FLOOR LEVELS TO BE EQUAL TO OR GREATER THAN THE 1 IN 100YR FLOOD (NO FREEBOARD)
- 3 ALL FLOOR LEVELS TO BE EQUAL TO OR GREATER THAN THE HHF PLUS 0.5M (FREEBOARD)
- 4 ALL FLOOR LEVELS TO BE EQUAL TO OR GREATER THAN THE PMF PLUS 0.5M (FREEBOARD)
- 5 FLOOR LEVELS TO BE AS CLOSE TO THE DESIGN FLOOR LEVEL AS PRACTICAL & NO LOWER THAN THE EXISTING FLOOR LEVEL WHEN AN ADDITION TO AN EXISTING BUILDING

FLOOD COMPATIBLE BUILDING COMPONENTS

- 1 ALL STRUCTURES TO HAVE FLOOD COMPATIBLE BUILDING COMPONENTS BELOW OR AT THE 1 IN 100 YEAR FLOOD LEVEL
- 2 ALL STRUCTURES TO HAVE FLOOD COMPATIBLE BUILDING COMPONENTS BELOW OR AT THE HHF LEVEL
- 3 ALL STRUCTURES TO BE CONSTRUCTED OF FLOOD COMPATIBLE MATERIALS BELOW OR AT THE PMF LEVEL

STRUCTURAL SOUNDNESS

- 1 ENGINEERS REPORT TO PROVE ANY STRUCTURE SUBJECT TO A FLOOD UP TO & INCL THE 1 IN 100 YR LEVEL CAN WITHSTAND THE FORCE OF FLOODWATER, DEBRIS & BUOYANCY
- 2 ANY STRUCTURE SUBJECT TO A FLOOD UP TO & INCL THE 1 IN 100 YEAR SHOULD WITHSTAND THE FORCE OF FLOODWATER, DEBRIS & BUOYANCY
- 3 ANY STRUCTURE SUBJECT TO A FLOOD UP TO & INCL THE HHF SHOULD WITHSTAND THE FORCE OF FLOODWATER, DEBRIS & BUOYANCY
- 4 ANY STRUCTURE SUBJECT TO A FLOOD UP TO & INCLUDING THE PMF LEVEL SHOULD WITHSTAND THE FORCE OF FLOODWATER, DEBRIS & BUOYANCY
- 5 GEOTECHNICAL ENGINEERS REPORT REQUIRED TO SPECIFY APPROPRIATE FILLING/EARTHWORKS & THE MEANS OF RETENTION OF BATTERS AGAINST SCOURING/EROSION

FLOOD EFFECT ON OTHERS

- 1 ENGINEERS REPORT REQUIRED TO PROVE THAT THE DEVELOPMENT OF AN EXISTING ALLOTMENT WILL NOT INCREASE FLOOD AFFECTATION ELSEWHERE
- 2 THE IMPACT OF THE DEVELOPMENT ON FLOOD AFFECTATION ELSEWHERE TO BE CONSIDERED

EVACUATION/ACCESS

- 1 RELIABLE ACCESS FOR PEDESTRIANS REQUIRED DURING A 1 IN 100 YEAR FLOOD
- 2 RELIABLE ACCESS FOR PEDESTRIANS & VEHICLES REQUIRED AT OR ABOVE THE PMF LEVEL
- 3 ELECTRONIC FLOOD WARNING DEVICES TO INSTALLED ON SITE & CONNECTED TO SES HEADQUARTERS
- 4 CONSIDERATION REQUIRED REGARDING AN APPROPRIATE FLOOD EVACUATION STRATEGY & PEDESTRIAN /VEHICULAR ACCESS ROUTE FOR BOTH BEFORE & DURING A FLOOD

FLOOD AWARENESS

- 1 RESTRICTIONS TO BE PLACED ON TITLE ADVISING OF MINIMUM FLOOR LEVELS REQUIRED RELATIVE TO THE FLOOD LEVEL
- 2 S149(2) CERTIFICATES TO NOTIFY AFFECTATION BY THE 1 IN 100 YEAR FLOOD
- 3 S149(2) CERTIFICATES TO NOTIFY AFFECTATION BY THE PMF FLOOD

MANAGEMENT & DESIGN

- 1 FLOOD PLAN REQUIRED WHERE FLOOR LEVELS ARE BELOW THE DESIGN FLOOR LEVEL
- 2 APPLICANT TO DEMONSTRATE THAT THERE IS AN AREA WHERE GOODS MAY BE STORED ABOVE THE 1 IN 100 YEAR FLOOD LEVEL PLUS 0.5M(FREEBOARD) DURING FLOODS.
- 3 NO EXTERNAL STORAGE OF MATERIALS BELOW THE 1 IN 100 YEAR LEVEL PLUS 0.5M(FREEBOARD) WHICH MAY BE POTENTIALLY HAZARDOUS DURING FLOODS
- 4 APPLICANT TO DEMONSTRATE THAT POTENTIAL DEVELOPMENT AS A CONSEQUENCE OF A SUBDIVISION PROPOSAL CAN BE UNDERTAKEN IN ACCORDANCE WITH THIS POLICY

The Floodplain Management Study identified areas of high hazard and having assessed the range of existing and potential land uses in this area, and a broad range of issues (inclusive of social, ecological and economic considerations) it was concluded that the majority of development should be prohibited within this area.

The principal of limiting further development within the high hazard flood zone is consistent with the Floodplain Development Manual and Circular No C9 issued by the (then) Department of Planning (now Department of Urban Affairs and Planning). However, a Development Control Plan cannot override an LEP insofar as it purports to place a prohibition on land uses otherwise permitted by the LEP within the zoning of the land. Accordingly to effectively implement the planning controls outlined above with respect to the DCP/LAP, it is necessary to amend the LEP so as to unequivocally prohibit the “undesirable” land uses within specific sections of the “floodplain”. Accordingly, the Floodplain Management Study recommended an amendment to the Blacktown LEP to recognise the desired restrictions on land uses within the floodway and alternate methods of implementing the amendment were identified.

5. HOW IS IT DIFFERENT FROM THE TRADITIONAL APPROACH AND WHAT ARE THE IMPLICATIONS?

The new approach discussed above differs from the traditional approach in three ways.

5.1 Use of the ‘Designated Flood’

Firstly, the traditional approach relies on the selection of a single designated flood. The extent of this flood is normally shown cross-hatched on the LEP and almost without exception, the 100 year flood has been adopted across NSW for this purpose. If a property is within the area affected by this flood, various flood policies could be applied by Council. If the land is not in this area, no specific flood policies would be applied.

Such an approach has generally led to a polarisation of the floodplain, and a perception that areas outside the cross-hatched area are not flood prone — “You’re either ‘in’ or ‘out’”. Unless the designated flood has been chosen as the PMF, there are flood risks outside the cross-hatched line and in some areas of the State (e.g. Blacktown), these risks can be significant (e.g. 11m depth of inundation). The traditional approach therefore fails to recognise that there are a range of flood risks within the floodplain. Some are severe, some are minor.

The new approach does not rely of the selection of a (single) designated flood, but considers a range of flood risks. In fact, the new approach does not use the term ‘designated flood’ at all and the authors of the paper believe that dropping this term may be beneficial.

5.2 Consideration of Land Use

Secondly, the traditional approach does not normally provide a comprehensive mechanism for controls to be varied with land use. Take for example floor level control.

The typical wording within a flood policy might be :

“all floor levels are to be a minimum of 0.5 above the 100 year flood level”

or the freeboard (in this case 0.5m) might be varied for commercial/industrial developments (to say 0.2m). But what about critical utilities or essential facilities (eg. hospitals, evacuation centres, SES headquarters, etc)? Shouldn’t higher standards apply given these special land uses? Similarly, in the case of other less critical developments (eg rural, sporting facilities, etc,) possibly lower minimum floor level controls may be appropriate. The new approach therefore provides for controls to vary for all the land use categories permitted within the LEP.

In addition, the new approach also provides specific guidelines to town planners identifying which land uses are unequivocally unsuitable within different sections of the floodplain.

5.3 Categories of Controls

Thirdly, many of the controls within older flood policies, relate only to limited categories, e.g. floor level control and land filling. As discussed above, controls over building components, structural soundness, flood impacts on others, evacuation and access, flood awareness, and management and design issues should also be considered if a comprehensive planning approach is to be applied.

6. CONCLUDING COMMENTS

We believe that the new approach to development of planning controls for floodplains outlined above goes to the essence of current floodplain policy and practice – i.e. it looks at the broad range of issues applicable to the floodplain as a whole and determines what controls should apply. It provides for a top-down approach (starting by looking at the overall floodplain and then determining required levels of management across the floodplain) as opposed to the traditional bottom-up approach of starting at the 100 year floodplain. The new approach is flexible and can be adopted as a model for most floodplains. The flood risk categories, land use categories and development controls are all matters which can and should be tailored to suit specific floodplains having regard to issues addressed at the FPMS stage. In addition to Blacktown, the authors have now applied the new approach to floodplains contained within the townships of Molong (Reference 4), Narrabri (Reference 5) and Bankstown (Reference 6).

Most importantly, if floodplain management is to be effective, the town planning controls emanating from floodplain management studies and plans must be accepted by the town planners of the respective Councils and be integrated within their planning instruments. The traditional planning controls generated in regard to flood issues have not progressed substantially since the production of the Floodplain Development Manual and indeed do not effectively reflect the detail, assessment and investigations necessarily covered by Floodplain Management Studies which investigate a broad range of issues.

The new approach provides greater flexibility to consider the broad range of issues (ecological, economic, social etc.) and a more comprehensive resource to assist town planners in their strategic planning role beyond the traditional “line on the map” mentality. Hopefully this will progress the ability for floodplain management to integrate into the planning process rather than to perpetuate the current predominating approach of integrating the planning process into floodplain management, which in the main has not been well accepted by planners.

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ABSTRACT

Improved planning controls are often the most significant measure within floodplain management plans. These controls must be developed within a comprehensive planning study if the intent of the Government's Floodplain Development Manual is to be followed. To date, the development of appropriate planning controls within floodplain management studies and plans has been hampered by reliance on a designated flood, which has unfortunately focussed attention on a single flood (usually the 100 year flood). Controls have also failed to comprehensively consider the varying land uses and flood risks on the floodplain.

A new approach to developing controls is presented in the paper based on work carried out as part of the Blacktown Floodplain Management Study. The approach provides controls within seven major categories (floor level, building components, structural soundness, flood impact on others, evacuation/access, flood awareness, and management and design), and allows these controls to vary with land use and flood risk. The resultant controls are summarised in a planning control matrix.

The authors have successfully applied the approach to a number of floodplains and believe the approach is flexible and suitable for use as a model for most floodplains. Use of the approach will assist in integrating floodplain management within the planning activities of local government.

KEY WORDS

Floodplain management, planning controls, development control, designated flood, flood standard, flooding, floor level, development, planning, Hawkesbury-Nepean, Blacktown.