

REDEVELOPMENT OF FLOOD PRONE AREAS

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Abstract

One of the challenges in floodplain management is how to achieve reductions in risks to property and persons in developed floodprone urban areas. This is typically a difficult task in comparison to 'greenfield' residential areas. Often by virtue of their 'floodprone tag' - through either a history of significant flooding and/or local government measures (eg the use of Section 149 certificates to identify potential flood risks) - existing urban areas can become depressed through the lack of re-development opportunities.

While some public sector funding may be available for the voluntary purchase of floodprone houses it is normally only available for severely floodprone cases. Hence whole neighbourhoods which may be only marginally floodprone cannot attract such funding and often the housing stock declines in quality. Subsequent low rents and other factors may lead to social stigmatisation which may lead to further declines in the quality of an area and the standard of living.

How can appropriate re-development be encouraged in floodprone areas? The recently completed North Wentworthville Floodplain Management Study looked at this challenge from an unconventional viewpoint and recommended the re-zoning of a low hazard floodprone residential area such that an increase in population density would result, but in a manner appropriate to the flood hazard.

This paper will explain the floodplain background and identify the town planning, environmental and engineering measures that were recommended as part of the re-zoning proposal 'package'.

Key Words: Reducing risk, green field areas, established areas, sterilisation versus redevelopment approach

Introduction

What is floodplain management all about? As with any profession, floodplain managers can often lose an understanding of the purpose of what they are doing when undertaking floodplain management projects. Perhaps the best expression of the aim of floodplain management, is outlined within the NSW Government Flood Prone Lands Policy Statement, as updated within the draft Floodplain Management Manual

"The primary objective of the policy is to reduce the impact of

flooding and flood liability on individual owners and occupiers of flood prone property and to reduce private and public losses resulting from floods, utilising ecologically positive methods wherever possible."

Firstly, it is a positive statement, that is, it is aimed at reducing the impact of flooding and reducing private and public losses resulting from floods.

Secondly, there is formal recognition of the philosophical change in floodplain

management that occurred during the 1990's which moved away from a concentration on hard engineering solutions which often impacted upon the river and floodplain environment towards more environmentally sympathetic solutions. A consequence of the movement away from engineering solutions towards environmentally orientated solutions is a greater emphasis being placed on planning solutions. We have spoken at past conferences about the constraints of integrating floodplain management with town planning and preferred alternate approaches (see Bewsher & Grech (1997) and Romano, Grech & Bewsher (1999)) and have always expressed the view that individual floodplains require the tailoring of individual planning solutions.

Broadly, floodplains can be dichotomised into *greenfield areas* and *established urban areas*. While never straight forward, floodplain management of greenfield areas can employ planning solutions which are reasonably obvious, such as the allocation of land uses relative to the hazard and the implementation of development controls on the siting and design of buildings (see Bewsher & Grech (1999)). But how do you actually use planning in established urban areas to reduce the risks of flood impacts on individual owners and public and private losses.

We have been involved in two particular floodplain management studies for catchments within established urban areas of Sydney: Boundary Creek in Flemington; and Coopers, Finlaysons and Toongabbie Creeks in North Wentworthville. The Floodplain Management Study for North Wentworthville was funded and managed by the Upper Parramatta River Catchment Trust, with input from Parramatta Council. The objective of this Paper is to answer this question having regard to the later Floodplain Management Study in particular.

Difference between greenfield and established areas

Greenfield areas are those areas identified for future urban development which are

presently in a substantially undeveloped state being either rural or vacant land. Typically, these areas would include the urban release areas within the western fringe of the Sydney metropolitan area such as Narellan, Prestons and Rouse Hill or the outward expansion of a rural town into a new area. The planning of a greenfield area presents the best opportunity to review flooding as one issue relevant to the planning and design of a new area. While there are a multitude of issues that must be considered in such a planning exercise, flooding can normally be dealt with appropriately in such a context.

Established areas are older developed parts of an urban area where buildings, roads and associated infrastructure have all been constructed and minimum original development potential exists. Established areas have usually been built before the extent of the flood hazard was known, particularly to the degree of understanding available to flood engineers today. Consequently these areas have not been designed or built in recognition of the flood hazard in full or part.

In established areas in NSW the flood hazard will eventually become known through either the floodplain management process in NSW where flood studies are prepared as a prelude to management plans, or alternatively a significant flood may occur. Subsequently properties within an established urban area become known as flood affected, either through local knowledge or by the application of planning controls and Section 149 Certificates (Zoning Certificates). Planners are reluctant to permit any further development on such properties due to the traditional perfunctory treatment of flooding as an absolute constraint. Every application in such an area, be it only for a house extension, becomes a nightmare for the home owner and Council.

The above scenario for an established area ultimately leads to a decline in the area. This is particularly the case where there are no amenity attributes associated with being located near to the watercourse which is the source of the flooding, because it has been formalised, engineered, or not maintained.

There are numerous examples of weed infested, partly concreted, partly formalised watercourses in Sydney which are seen by the community as a negative element in their locality. The creek systems in both the Flemington and North Wentworthville studies are typical examples.

Sterilisation versus Redevelopment

The traditional approach to reducing risk and damages is to prevent anyone from undertaking any further development or any activity within the floodplain, as a means of ensuring that there is no increase in property value or population within the area which could be affected by flooding. We call this the sterilisation approach. This approach is normally a reactive means of maintaining the status quo and does not direct itself to achieving a reduction in damages and risk as required by the State Government Flood Prone Lands Policy.

The alternate approach is to encourage the removal of the existing development which is not sited and designed in recognition of the flood hazard and permit less flood sensitive development. We call this the redevelopment approach. The redevelopment approach could involve both the change of land use and/or the requirement for specific siting and design criteria for rebuilding.

Because of the poor image a flood affected established urban area may have developed, the redevelopment option needs to be proactively encouraged. Such encouragement may include increased development potential, through a change in land use zonings, increased development densities or an improved creek environment. These incentives can also be compatible with floodplain management objectives. For example in the North Wentworthville Study it was concluded the change in land use from single detached houses to residential flats would provide an opportunity to relocate the footprint of buildings, raise habitable floors and employ modern flood proofing techniques to achieve a reduction in potential flood damages. Further, an improvement in the creek environment provided the

opportunity to recover some of the ecological value of the watercourses, improve their visual appearance through landscaping and bush regeneration, encourage usage, improved security through the provision of pedestrian/cycle routes and the reorientation of dwellings, and to make these lands once again useful and desirable components of the locality

The need to fit into a Planning Strategy

Flooding is only one issue which needs to be balanced in the preparation of a planning strategy. Accordingly, the redevelopment approach may not be a possible solution unless it is consistent with, or at least compatible with, the overall planning strategy appropriate for an area. During the 1990's, Local Metropolitan Councils had been required by the NSW Government to produce residential strategies to underpin the urban consolidation objectives of the Government.

Both the Flemington and North Wentworthville examples were compatible with the residential strategies being prepared by the respective Councils (Strathfield and Parramatta). Notwithstanding, the timing and extent of redevelopment for more intense forms of residential buildings became an issue which needed to be resolved. In the Flemington situation, the issue became one of land use – whether an industrial/business land use was preferable to residential flat buildings. In the North Wentworthville case, the issue became whether there were higher priority areas for rezoning for residential flat building purposes.

In all situations, redevelopment of an established area will produce considerable debate amongst the community due to the inevitable change to the character of the area, the necessity for relocation of the existing community and the cost to Government in facilitating the redevelopment and providing relevant infrastructure and services. Because flood affected established urban areas can often have a depleted image, a change can often be seen as a positive and desirable outcome.

In the North Wentworthville case, the existing development comprised a substantial proportion of older houses in poor condition, and an inaccessible, and substantially weed infested corridor of land with security problems. The redevelopment provided the opportunity to replace the older depleted housing stock, provide modern flat development with greater setbacks to the creek, removal of all development from the more hazardous floodway component of the floodplain, apply appropriate flood related building controls and to generate income through Section 94 Development Contributions towards the rehabilitation of the creek corridor.

Case Study – North Wentworthville

The North Wentworthville Floodplain Management Study examined the floodplain at the confluence area of Coopers Creek, Finlaysons Creek and Toongabbie Creek and the largest number of floodprone properties were found to be within the area principally affected by backwater flooding from Toongabbie Creek. In that mainly backwater area there were found to be 35 properties fully inundated and 62 properties partially inundated including 29 cases of above habitable floor level flooding in the 1% AEP event.

The majority of the properties are older style detached dwellings with a mix of brick veneer, weatherboard and 'fibro' construction. While there were a few examples of recent property improvements most of the properties appear to be unchanged from the time of their construction. In addition all the properties which back directly on to one of the creeks (principally being Coopers Creek or an anabranch of Toongabbie Creek) have their dwellings facing their street frontages and therefore there is a constant barrier of paling and 'colorbond' style fences lining the creek reserves.

The vast majority of the 'backwater area' flood prone properties were within areas defined as low hazard in a 1% AEP event and either directly have access to their own non-floodprone streets or such access is nearby. Given that situation, it was considered that evacuation access was not an impediment and changes to existing planning controls, such as to allow multi-unit housing, might have the potential to address the existing flood problems by improving the opportunity for property redevelopment.

The study proceeded to examine five options for the floodplain management of the study area for Council's consideration, being:

1. Do nothing
2. Raise all houses
3. Back zone all flood affected land
4. Pursue Draft Parramatta LEP (Housing) 1997 (which was to permit some flats and single storey multi-unit housing)
5. Pursue proposal within the draft FPMS for the study area (a Residential 2(c) zoning which would permit up to 4 to 6 storey residential flat buildings – refer to Figure1).

Importantly, it was also found that the rezoning to 2(c) would increase the Section 94 developer contributions towards open space and recreational facilities (as shown in Table 1) which could be used to fund a substantial portion of the costs involved in restoring the adjacent degraded creek corridors.

Figure 1

Recommended Redevelopment Option

(Don Fox Planning, Aug 1998, Illustration. 6)

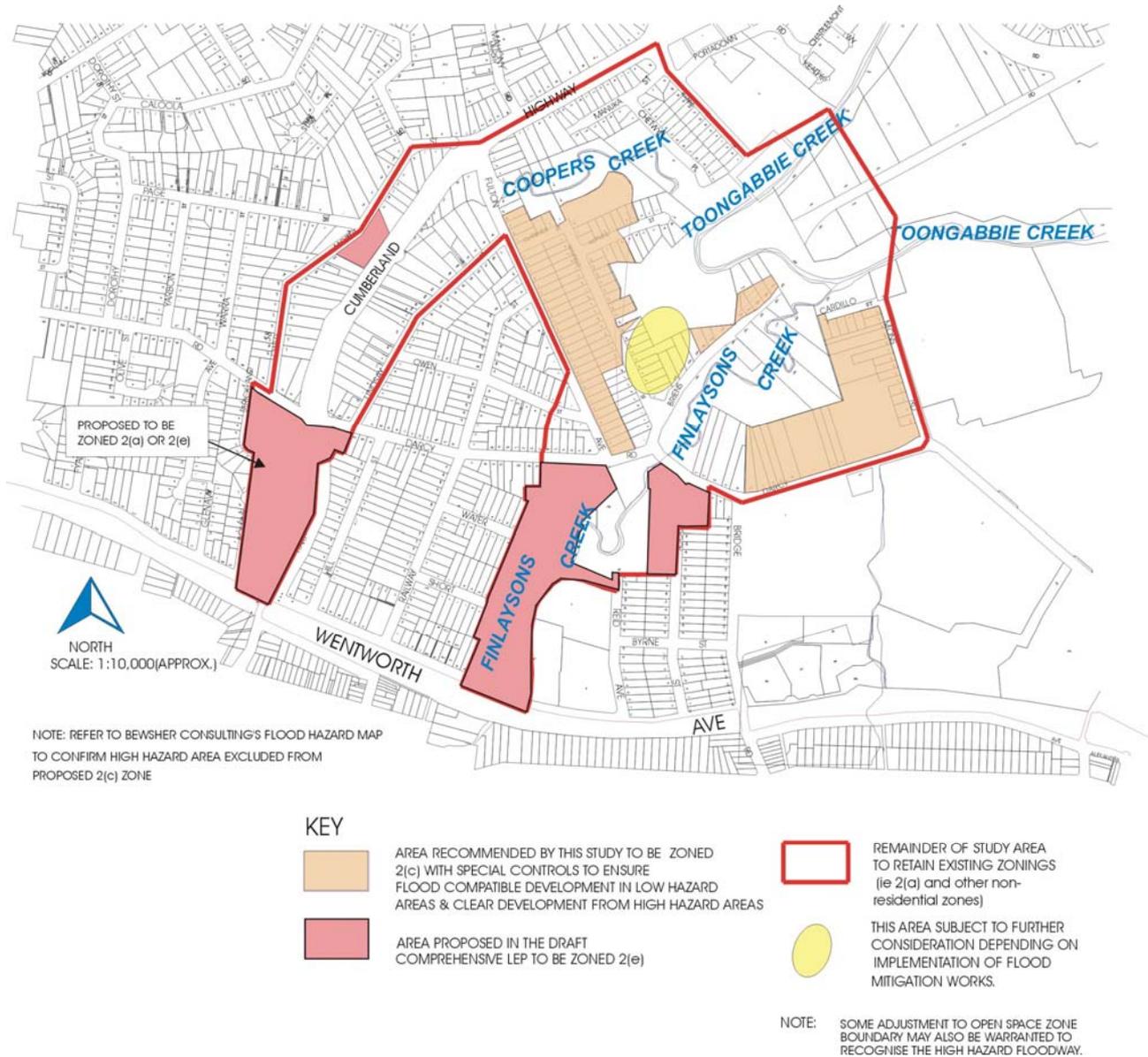


Table 1 – Dwelling Growth and Section 94 Potential under Development Options

	DLEP 1997 2(b) Zone Option 4	FPMS 2(c) Zone Option 5
Lots with potential for:		
• Townhouses/Villas	141	0
• Flats	79	180
Potential Developable Area		
• Townhouses/Villas	10.1 ha	0
• Flats	13.2 ha	20.2
Potential Additional Dwellings		
• Townhouses/Villas (1)	455	0
• Flats (2)	990	1515
Net Additional Dwellings		
• Townhouses/Villas	314	0
• Flats	911	1335
Additional S.94 Fees (3)		
• Townhouses/Villas	\$230,000	\$0
• Flats	<u>\$657,000</u>	<u>\$963,000</u>
TOTAL	\$887,000	\$963,000

(1) Assumes a density of 45 dwellings/ha.

(2) Assumes a density of 75 dwellings/ha and 4 storey multi-unit development.

(3) Assumes only 25% of development potential achieved in a reasonable time (say 10 years) and credit achieved for existing population and the result is rounded.

(Ref: Don Fox Planning, August 1998, pg.17)

It was considered that such restoration would also encourage development to face the watercourses to take advantage of the new creek landscaped environment, and substantially improve the community image of the creek corridors. The options were evaluated in detail and conclusions drawn included the following:

- Having regard to economic viability, flood damages, social impact, environmental improvements and public sector costs. Option 5, being the FPMS, significantly outperformed all other options.
- There was unequivocally a demand for residential flat dwellings anywhere within the study area. While villa home and townhouse development would not be economically viable within the study area (having prepared typical developer feasibilities for analysis), residential flat building development would be.
- One of the major factors which would facilitate the development of that part of the study area recommended for residential flat development is the larger allotments with modest sized and relatively poor standard housing, which substantially increases the potential for the purchase and amalgamation of properties. This placed the subject study area in a substantial advantage over the majority of existing and proposed residential flat zoned areas.
- Villa and townhouse development as proposed under Scenario 4, was not economically viable due to current sale prices for residential properties and development costs, resulting in non-profitable development yields. Conversely residential flat development within the additional areas identified by the FPMS (Scenario 5) would be economically viable.
- Existing 1% AEP direct flood damages of \$0.7 million to \$0.3 million (depending on flood mitigation works constructed) could be removed by Scenario 5.
- The economic and social impact associated with flood inundation would be potentially removed by Scenario 5.
- Environmental improvements to the creek corridor are a specific requirement of the current State Government Flood Policy. Scenario 5 provided the greater impetus for environmental improvements.
- Indicative costs for the improvement works proposed for the creek corridor would be in the order of \$0.5 to \$1.0 million. Council's existing responsibility to implement works to restore the integrity of the creek corridors and to enable their proper utilisation for open space purposes could be funded by Section 94 Developer Contributions.

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- Both Scenarios 4 and 5 could provide the potential for Section 94 Contributions to meet the estimated creek corridor improvement costs. Scenario 5 slightly out performed Scenario 4.

Evaluation of all options having regard to the above criteria demonstrated that the proposal outlined within the FPMS substantially out performed all other options.

Conclusion

If we are to continue to undertake floodplain management into the 21st Century we need to be proactive to satisfy the floodplain management objectives for all situations. The traditional sterilisation approach for established urban areas achieves little towards the satisfying of the NSW State Government Flood Prone Land Policy objectives of reducing private and public flood risk damages. Greenfield situations are different to established urban areas and Floodplain Management approaches and outcomes must be reflective of this.

The sterilisation versus redevelopment approaches must be evaluated in the preparation of floodplain management studies and plans in established urban areas, otherwise the community can point the finger at us as failing to implement appropriate floodplain management practice and the implementation of State Government policy. While the redevelopment approach may not always be appropriate in each case, the historical evolution and planning context of such areas will often provide ideal opportunities to implement this approach.

Most importantly, the implementation of this approach can achieve significant benefits both with regard to the floodplain management objectives of reducing flood damages and risks, as well as achieving the planning objectives of providing a better urban environment for the community and restoring the ecological value of our urban waterways.

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Note: A copy of this paper and related papers can be found on the internet at: www.bewsher.com.au.

Author's Biography



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Drew holds a Bachelor Degree with Honours from the University of Tasmania and a Master of Science Degree from the Californian Institute of Technology. He has 23 years of experience working in a wide range of water engineering fields in Australia, South East Asia and America. His particular interest and expertise lie in the fields of floodplain management, computer modelling of hydrological and hydraulic systems, community consultation and environmental aspects of water engineering projects.

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