

Double Bay Catchment Floodplain Risk Management Study & Plan



Double Bay, April 1988 flood (source: Mr Tony Gregory)

Final Report

November 2011

Report of Woollahra Municipal Council's Floodplain Management Committee,
prepared by



WOOLLAHRA MUNICIPAL COUNCIL

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Prepared by:

Bewsher Consulting Pty Ltd
6/28 Langston Place, Epping NSW 2121 Australia
P O Box 352, Epping NSW 1710 Australia
Telephone: (02) 9868 1966. Facsimile: (02) 9868 5759
Web: www.bewsher.com.au E-mail: postmaster@bewsher.com.au
ACN 003137068. ABN 24 312 540 210

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FOREWORD

In New South Wales the prime responsibility for local planning and the management of flood liable land rests with local government. To assist local government with floodplain management, the NSW Government has adopted a Flood Prone Land Policy in conjunction with the *Floodplain Development Manual*.

The Policy is directed at providing solutions to existing flood problems and to ensure that new development is compatible with the flood hazard and does not create additional flood problems.

The Policy sets out four sequential stages in the process of floodplain management:

- | | |
|-------------------------------------|---|
| 1. Flood Study | Assessment to define the nature and extent of the flood problem. |
| 2. Floodplain Risk Management Study | Evaluation of management options for the floodplain with respect to both existing and proposed development. |
| 3. Floodplain Risk Management Plan | Formal adoption by Council of a management plan for floodplain risks. |
| 4. Implementation of the Plan | Measures undertaken to reduce the impact of flooding on existing development, and implementing controls to ensure that new development is compatible with the flood hazard. |

The *Double Bay Catchment Flood Study* was prepared by Bewsher Consulting and adopted by Council in December 2007.

This *Floodplain Risk Management Study and Plan* (FRMS&P) constitutes the second and third stages of the management process for the Double Bay catchment. In broad terms, the report investigates what can be done to minimise the effects of flooding in the Double Bay catchment and recommends a strategy in the form of a Plan.

Woollahra Municipal Council commissioned Bewsher Consulting to prepare this report. It has been prepared with financial assistance from the NSW Government through the Office of Environment and Heritage (OEH). This document does not necessarily represent the opinions of the NSW Government or the Office of Environment and Heritage.

The assistance of Woollahra Council's Floodplain Management Committee and officers from Council and OEH in preparing this document is gratefully acknowledged. The assistance of Grech Planners in providing town planning input is also acknowledged.

This report was adopted on 14th November 2011.

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LIST OF ABBREVIATIONS

AHD	Australian Height Datum
ALS	Airborne Laser Scanning
ARI	Average Recurrence Interval
DEM	Digital Elevation Model
DLWC	Department of Land and Water Conservation
FRMP	Floodplain Risk Management Plan
FRMS	Floodplain Risk Management Study
GIS	Geographic Information System
LGA	Local Government Area
OEH	Office of Environment and Heritage
PMF	Probable Maximum Flood
WSUD	Water Sensitive Urban Design

EXECUTIVE SUMMARY

Bewsher Consulting Pty Ltd are specialist flood risk management consultants who were commissioned by Woollahra Municipal Council, with financial assistance from the Office of Environment and Heritage (OEH), to prepare a Floodplain Risk Management Study and Plan (FRMS&P) for the Double Bay catchment, located in Sydney's east.

The *Double Bay Catchment FRMS&P* has been overseen by Woollahra Council's Floodplain Management Committee, which comprises councillors and officers from Council, OEH, the State Emergency Service (SES), Sydney Water and the Double Bay Residents' Association.

Principal Outcomes

The principal outcomes of this study include:

- ▶ Identification of the community's views on existing flood problems and their possible solution (**Chapter 3**);
- ▶ Summary of flood behaviour defined in the *Double Bay Flood Study*, as well as definition of the 100 year flood with an assumed culvert blockage factor (**Section 4.1**);
- ▶ The sensitivity of flood behaviour to the potential impacts of climate change (**Section 4.2**);
- ▶ An assessment of potential flood damages in the Double Bay catchment – an estimated 62 dwellings and 142 businesses would be flooded above floor level in the 100 year flood; the average annual damages of flooding is estimated to cost \$3.7 million (**Chapter 5**);
- ▶ An evaluation of potential floodplain management measures to reduce flood damages (**Chapter 6**); and
- ▶ A recommended Floodplain Risk Management Plan (FRMP) for the Double Bay catchment (**Chapter 7**).

The Floodplain Risk Management Plan

High priority measures include:

- ▶ Install secure fencing adjacent to SWC32 from the BOOS conduit to New South Head Road, to prevent objects entering the drain and potentially blocking culverts;
- ▶ Amend the flood risk management provisions in the DCP in accordance with best practice and to incorporate climate change flood risk considerations;

- ▶ Improve emergency management planning by preparing a Local Flood Plan for Woollahra LGA;
- ▶ Improve public flood readiness by 1) preparing a Double Bay Commercial District flood-proofing brochure, 2) preparing a Double Bay Commercial District flood emergency response plan template, 3) conducting a Business FloodSafe breakfast (SES), and 4) installing safety signage at Lough Playing Fields and Manning Road; and
- ▶ Prepare a questionnaire and institute processes to facilitate the rapid capture of flood data following future flooding in Woollahra LGA.

Medium priority measures include:

- ▶ Further investigate and if feasible implement the Bellevue Road conduit scheme as outlined in **Figure 6.3**;
- ▶ Implement the Bay Street/Knox Street conduit scheme as outlined in **Figure 6.4**;
- ▶ Implement the Ocean Avenue conduit scheme as outlined in **Figure 6.4**; and
- ▶ Carry out minor outlet works for the pipe joining SWC32 near Nos. 24-26 Glendon Road.

Low priority measures include:

- ▶ Further investigate (including consultation) and if practical invite owners of six Manning Road properties to join a voluntary house redevelopment scheme, which would offer a subsidy to landowners to redevelop buildings in a flood-compatible manner (refer to **Section 6.2.1**).

Funding

The total capital cost of implementing the Plan is estimated to be \$13.0-14.5M. The timing of proposed works will depend on overall budgetary commitments of Council and the availability of funds from other sources. It is envisaged that the Plan would be implemented progressively over a 5 to 10 year time frame.

1. INTRODUCTION

1.1 BACKGROUND

Storms are known to have generated flooding problems in Double Bay throughout its history. Some residents reported houses inundated above floor level in the November 1984 event. Some shops were inundated in the April 2007 event.

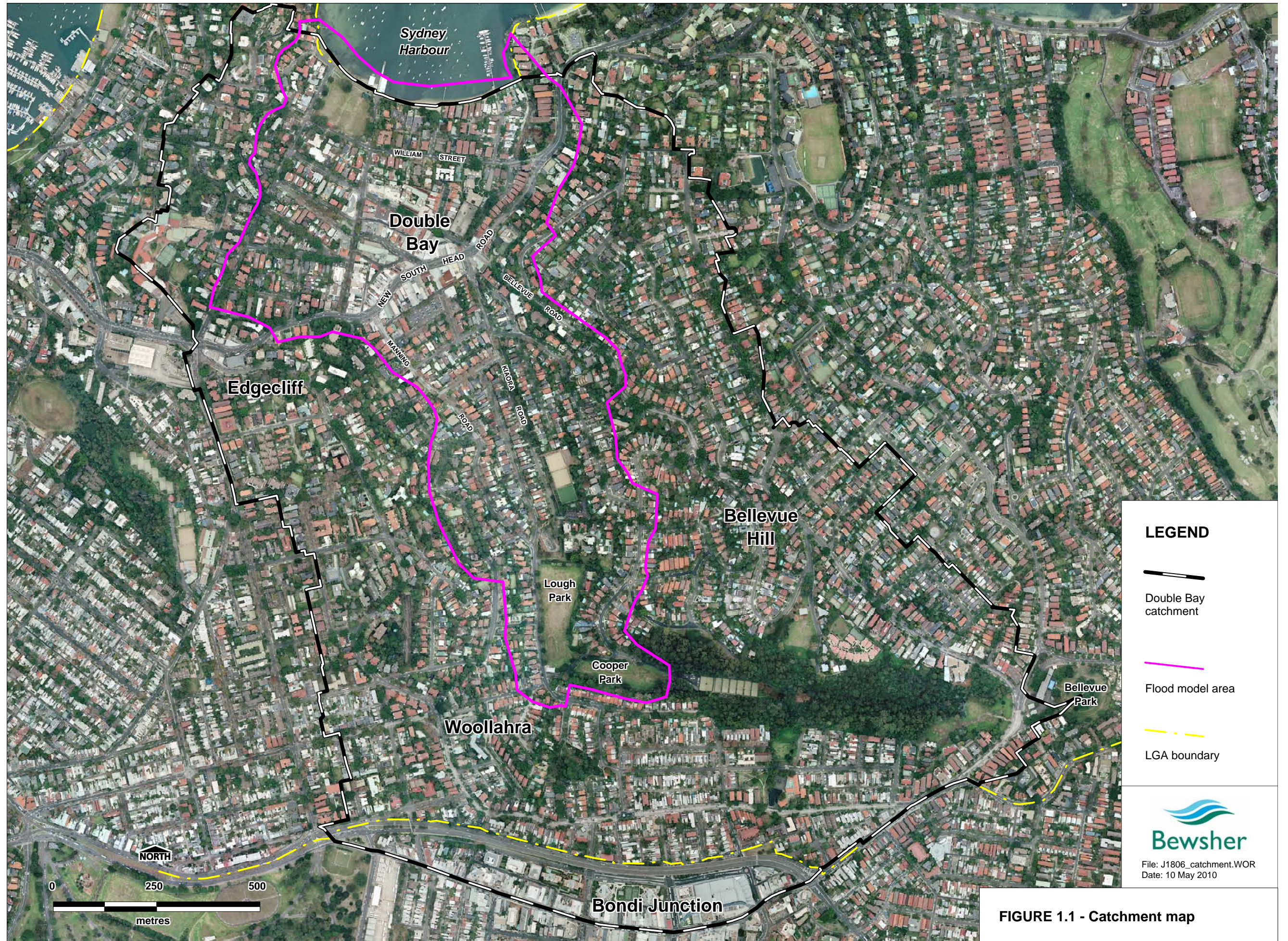
In order to better understand flooding, Woollahra Municipal Council commissioned the *Double Bay Catchment Flood Study*, which was formally adopted in December 2007 (see Bewsher Consulting, 2008). This defines flood levels, depths and extents for a range of design flood events such as the 100 year flood.

The Flood Study provides the opportunity for an assessment of flooding problems and the development of strategies to manage the flood risk. Council commissioned Bewsher Consulting to prepare the *Double Bay Catchment Floodplain Risk Management Study & Plan* (FRMS&P). This report comprises the FRMS&P aspects of the floodplain management process (see **Section 1.3**).




In addition, this report presents the results of two flood sensitivity tests which were not presented in the Flood Study report – the first allowing for blockage of four major hydraulic structures (see **Section 4.3**), and the second testing the potential impacts of climate change (see **Section 4.4**).

1.2 THE STUDY AREA

The study area comprises the Double Bay and West Double Bay catchments, which were the subject of the *Double Bay Catchment Flood Study*. The combined catchment is a small and short catchment in Sydney's eastern suburbs, draining the area from Bondi Junction through Double Bay to Sydney Harbour (**Figure 1.1**).



LEGEND

-  Double Bay catchment
-  Flood model area
-  LGA boundary



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Date: 10 May 2010

FIGURE 1.1 - Catchment map

1.3 THE GOVERNMENT'S FLOODPLAIN MANAGEMENT PROCESS

The NSW Government's Flood Prone Land Policy and a *Floodplain Development Manual* (NSW Government, 2005) form the basis of floodplain management in NSW. The main responsibility for managing flood prone lands in NSW rests with local government councils. The NSW Government's Floodplain Management Program is administered by the Office of Environment and Heritage (OEH) and provides councils with technical and financial assistance to undertake flood and floodplain risk management studies, and for the implementation of works identified in those studies. The Department of Planning is responsible for assisting councils on land use planning matters consistent with the *Floodplain Development Manual* (NSW Government, 2005).

The primary objective of the Flood Prone Land 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.

For existing developed areas, the impacts of flooding shall be reduced by flood mitigation works and measures, including on-going emergency management measures, the raising of houses where appropriate and by development controls. For areas proposed for development or redevelopment, the potential for flood losses shall be contained by the application of ecologically sensitive planning and development controls.

The implementation of the Flood Prone Land Policy generally culminates in the preparation and implementation of a FRMP by Council, which is the ultimate objective of the current study. Community consultation is an important part of the process and this has been undertaken via Council's Floodplain Management Committee and public displays and questionnaires with the local community.

The steps in the floodplain management process are summarised in **Figure 1.2**.

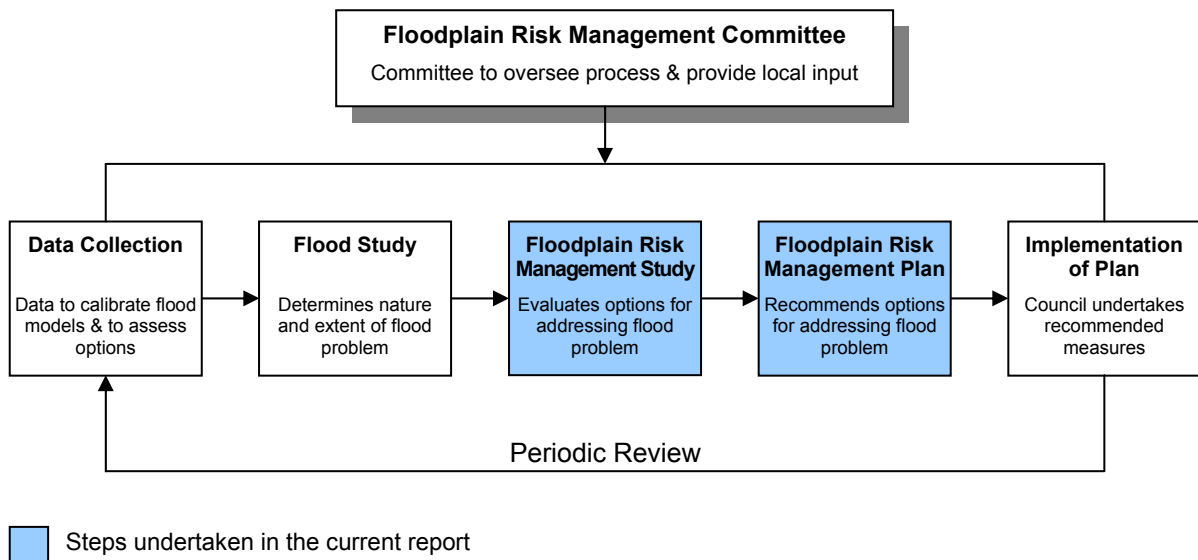


FIGURE 1.2 – The Floodplain Risk Management Process

2. BACKGROUND INFORMATION

2.1 CATCHMENT DESCRIPTION AND LANDUSE

The Double Bay catchment has an area of about 2.8 km² which drains to Port Jackson (Sydney Harbour). It includes Double Bay and parts of Edgecliff, Woollahra, Bellevue Hill and Bondi Junction. Of the total area, 0.3 km² represents the West Double Bay portion of the catchment which has separate pipelines conveying local runoff to the harbour.

The topography of the catchment is depicted in **Figure 2.1**, which is a Digital Elevation Model (DEM) derived from an Airborne Laser Scanning (ALS) survey flown in December 2005. The highest elevation on the catchment boundary is just over 100 metres near Bellevue Park. There is a well-defined valley, and significant overland flows have been reported flowing off the higher valley sides towards the valley floor at about Kiaora Road (see **Section 3.5**).

The upper section of the catchment comprises residential and commercial development and limited areas of open space apart from Cooper Park (see **Figure 1.1**). Cooper Park extends for 1100 metres in an east-west direction and contains 12 hectares of urban bushland, including an endangered species, the Sunshine Wattle (Woollahra Municipal Council, 2001). Stormwater within the upper section of the catchment is carried within the underground piped network, or when this is exceeded, along roads or through private property.

The lower section of the catchment is dominated by the Double Bay commercial district (see **Figure 2.2**), with high density residential development nearby. Stormwater collects into the open channel downstream of Lough Park and the receiving covered channel which passes under the Double Bay retail area. Sydney Water owns and maintains the major open and covered channels between Lough Park and the harbour, while Council owns and maintains the stormwater pipe systems.

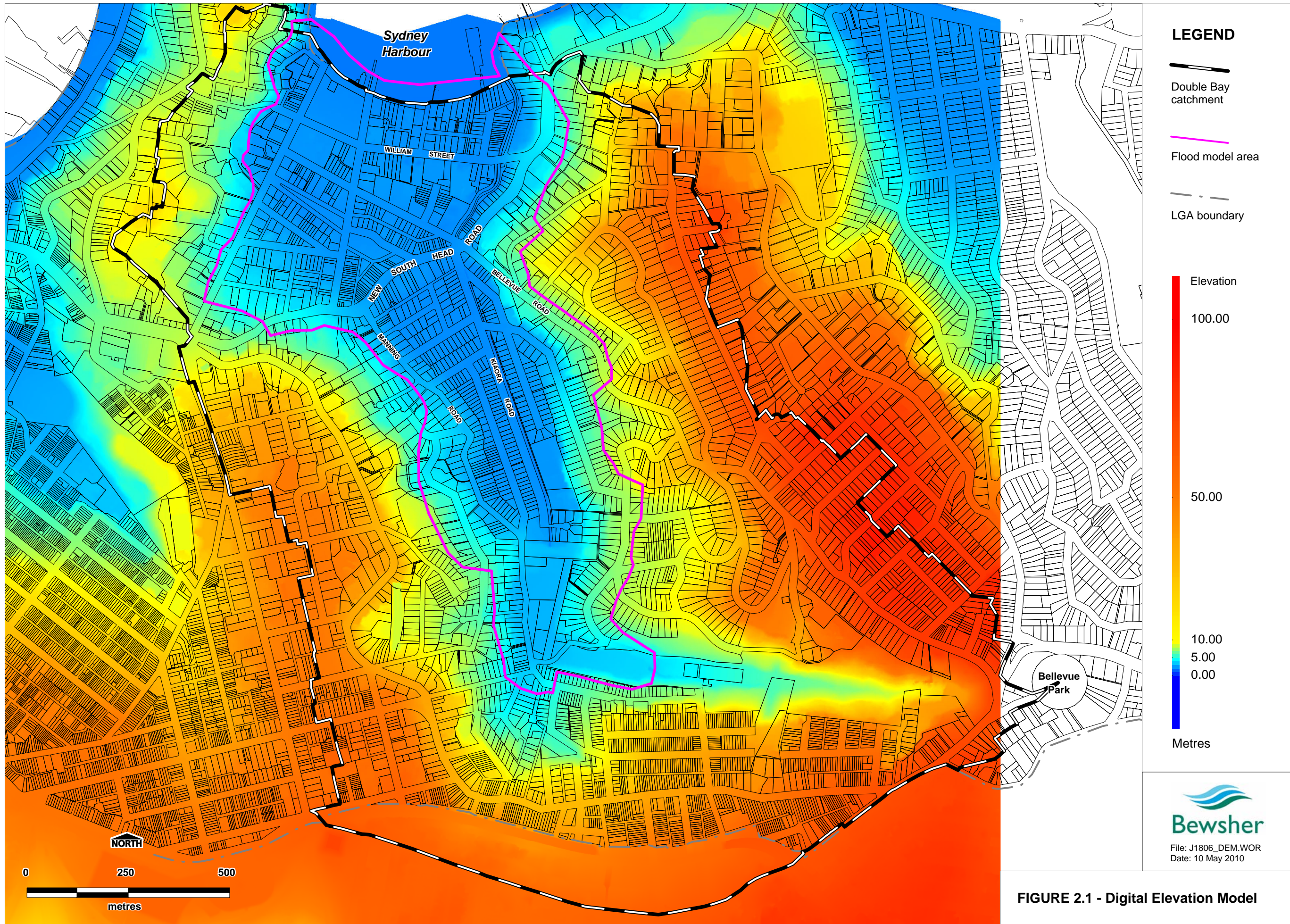




FIGURE 2.2 – Double Bay Commercial Area, looking west

Source: www.bing.com

2.2 FLOOD HISTORY

Floods that are reported to have caused damage or inconvenience in the Double Bay catchment are summarised in **Table 2.1**. This record, undoubtedly incomplete, suggests that flooding has been a relatively frequent occurrence in the catchment, though few events have been of sufficient severity to inundate houses above floor level. Of the floods considered for the *Double Bay Catchment Flood Study*, the November 1984 flood was the worst.

TABLE 2.1 – Historical Floods

Sources: Bewsher Consulting (2008); *Sydney Morning Herald* (see **Appendix A**)

Date	Location	Consequence
Apr 1860		Market gardens and New South Head Road damaged.
Apr 1867		Many houses ankle deep and some knee deep in water. Nursery and road damaged.
May 1933		Low lying areas inundated.
Nov 1940	New South Head Road	Water 0.3m deep opposite Hoyts theatre. Transport disrupted.
May 1943	Bowling Club, Glendon Road	Fence carried away.
Sep 1943	Epping – Kiaora – Leura Roads	Several garages and yards flooded.
	New South Head Road	Buses caused bow wave into some shops.
	Cross Street	Several properties badly flooded.
Jun 1949	Epping Road	Some properties flooded including Bowling Club.
Jul 1950	Manning Road	Badly flooded.
Sep 1951	Epping Road	Some properties flooded.
Aug 1983	New South Head Road	Shops flooded, buses caused bow wave 1m deep.
Nov 1984	Court – Kiaora Roads	Most properties suffered water damage, exceeding floor level in some cases.
Apr 1988	Glendon Road	
1989	Manning Road	Two cars severely damaged.
Jan 1991	Manning Road	One car severely damaged.
Apr 2007	Kiaora Road	
	New South Head Road	Several shops flooded.

2.3 ACID SULPHATE SOILS

Acid Sulphate Soils (ASS) is the common name given to naturally occurring soils that contain iron sulfides. Problems arise when these naturally occurring sulfides are disturbed and exposed to air, creating sulfuric acid. The sulfuric acid can drain into waterways and cause severe environmental damage and damage to steel and concrete structures.

Figure 2.3 identifies land according to its probability of ASS. The map was adapted from the NSW Acid Sulfate Soils Risk Map produced by the former DLWC in 1998.

Based on clause 25D in *Woollahra Local Environmental Plan (LEP) 1995*, consent is required for works, including drainage works, below existing ground level for class 2 land (**Figure 2.3**), beyond 1 metre below existing ground level for class 3 land or which are likely to lower the water table (see the notations for class 1,2 and 5 land). Council may require a preliminary assessment or preparation of an Acid Sulphate Soils Management Plan (see Woollahra Municipal Council, 2004).

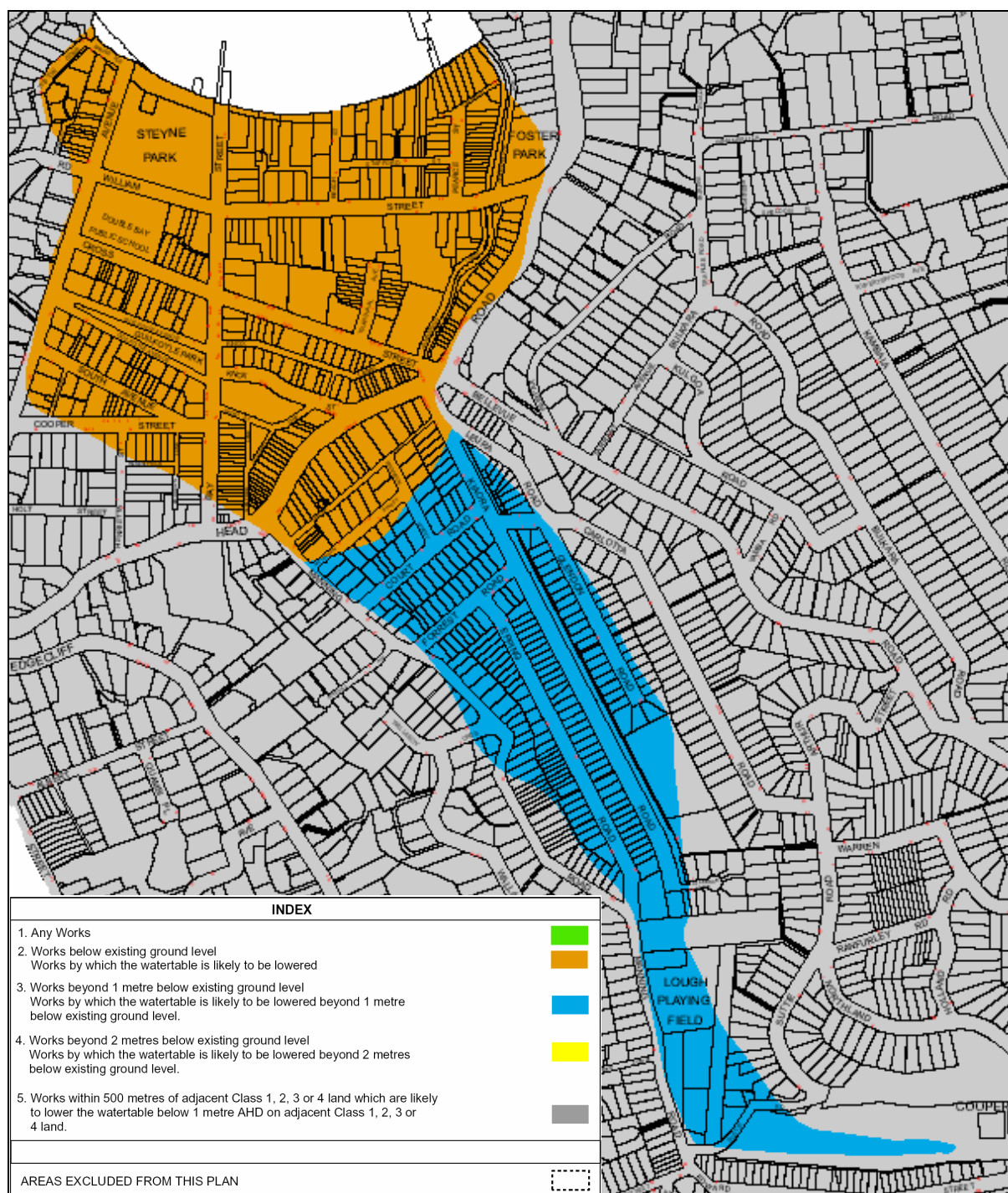


FIGURE 2.3 – Acid Sulphate Soils Planning Map
Source: Woollahra LEP 1995 Amendment No 39 (map dated 14 March 2005)

2.4 SOCIAL PROFILE

An understanding of social characteristics is an important consideration for floodplain risk management studies. Data from the 2006 Census was extracted for Double Bay. Some key points are summarised in **Table 2.2** and discussed below.

- ▶ Based on the average household size of 2.1 persons, and based on the 413 dwellings located within the modelled PMF floodplain, it is estimated that about 900 people live (and many others work and shop) in the floodplain of the Double Bay catchment.
- ▶ Compared to NSW as a whole, Double Bay has a low proportion of children aged under 15 years and a high proportion of residents aged over 64 years.
- ▶ Although a lesser proportion of people in Double Bay are Australian-born compared to NSW as a whole, many of those born overseas come from England, South Africa and New Zealand, so relatively few people speak languages other than English. Among those languages, European languages dominate, in some cases associated with the proximity of consulates.
- ▶ Double Bay is an affluent suburb, with many persons employed as professionals and managers and a median individual income more than twice that of NSW as a whole.
- ▶ The average motor vehicle ownership rate in Double Bay is 1.2 vehicles/dwelling, which compares to 1.5 vehicles/dwelling for NSW as a whole.
- ▶ Double Bay has a very high proportion of flats, units and apartments, and a high proportion of tenants.
- ▶ Double Bay has a low proportion of dwellings without an internet connection.
- ▶ Double Bay has a high turnover of population.

Potential implications for floodplain management are:

- ▶ An affluent community may be more willing to fund floodplain mitigation measures.
- ▶ The high proportion of residents aged 65 years and over, and the high proportion of dwellings without motor vehicles represent potential challenges should evacuation be required as a result of flooding.
- ▶ It may be unnecessary to prepare flood educational materials in languages other than English.
- ▶ The high turnover of population suggests that any educational initiatives would need to be repeated – or, better, to be integrated into the everyday.
- ▶ The internet could be a fruitful vehicle for conveying educational messages and other information, but should not be regarded as comprehensive.

TABLE 2.2 – Census Data for Double Bay Suburb

 Source: 2006 Census Basic Community Profiles, www.censusdata.abs.gov.au/

	Double Bay	NSW		Double Bay	NSW
SELECTED PERSON CHARACTERISTICS [B01]: % of persons			NUMBER OF MOTOR VEHICLES BY DWELLINGS [B29]: % of occupied private dwellings		
Total persons	4703	100.0%	Dwellings with 0 motor vehicles	18.6%	11.6%
Aged 14 years and under	12.4%	19.8%	Dwellings with 1 motor vehicle	48.5%	38.3%
Aged 65 years and over	18.8%	13.8%	Dwellings with 2 motor vehicles	27.2%	33.1%
Aboriginal/Torres Strait Islander	0.1%	2.1%	Dwellings with 3+ motor vehicles	5.7%	13.0%
Australian born	56.2%	69.0%	Average number of motor vehicles per occupied private dwelling	1.2	1.5
Born overseas	34.1%	23.8%	DWELLING STRUCTURE [B31]: % of occupied private dwellings		
Speaks English only	76.9%	74.0%	Separate house	20.7%	71.4%
Speaks language other than English	14.7%	20.1%	Semi-detached, row or terrace house, townhouse etc	9.6%	9.7%
Australian citizen	78.5%	85.8%	Flat, unit or apartment	69.2%	17.7%
SELECTED MEDIANS AND AVERAGES [B02]			Other dwelling	0.2%	1.1%
Median age	39	37	TENURE TYPE BY DWELLING STRUCTURE [B32]: % of occupied private dwellings		
Median individual income (\$/week)	\$957	\$461	Fully owned	37.5%	34.8%
Median household income (\$/week)	\$1,815	\$1,036	Being purchased	17.5%	31.9%
Median housing loan repayment (\$/month)	\$2,600	\$1,517	Rented	40.4%	29.5%
Median rent (\$/week)	\$400	\$210	TYPE OF INTERNET CONNECTION [B35]: % of occupied private dwellings		
Average household size	2.1	2.6	No internet connection	24.0%	35.1%
LANGUAGE SPOKEN AT HOME [B12]			POPULATION CONTINUITY [B37,B38]: % of persons aged 1 or 5 years and over		
Other language speakers as % of all other language speakers (results shown >5.0%)	Hungarian 8.6%	Arabic 9.7%	Persons enumerated same address 1 year ago	70.7%	79.5%
	Italian 8.3%	Cantonese 7.6%	Persons enumerated same address 5 years ago	40.9%	55.0%
	French 7.8%	Mandarin 5.9%			
	Greek 7.7%	Italian 5.1%			
	Cantonese 7.4%	Russian 6.1%			
	Russian 6.1%	Greek 5.1%			
	Mandarin 5.2%				

2.5 HERITAGE ISSUES

2.5.1 Aboriginal Heritage

The traditional Aboriginal owners of much of the Woollahra district were the Cadigal band. Woollahra Municipality is rich in evidence of early Aboriginal history, with over 70 sites including 13 midden sites, 29 rock engraving and numerous shelters, many with axe grinding grooves where stone tools were made and sharpened. Some sites are in private gardens: others are in parks and public areas, with a number along coastal walks and the harbour foreshore.¹

Based on clause 31 in *Woollahra LEP 1995*, and in accordance with the *National Parks and Wildlife Act 1974*, any proposed floodplain management works that might disturb or damage an Aboriginal object or place require development consent and a permit under section 87 of the Act.²

2.5.2 European Heritage

The Double Bay catchment was first settled by Europeans soon after the arrival of the First Fleet in 1788. The *Woollahra LEP 1995* (Schedule 3) lists heritage conservation areas and heritage items (see also **Figure 2.4**). Any proposed floodplain management works that might alter or demolish a heritage item require development consent.

¹ www.woollahra.nsw.gov.au/local_information_and_activities/indigenous/indigenous_heritage

² www.environment.nsw.gov.au/conservation/aboriginalculture.htm

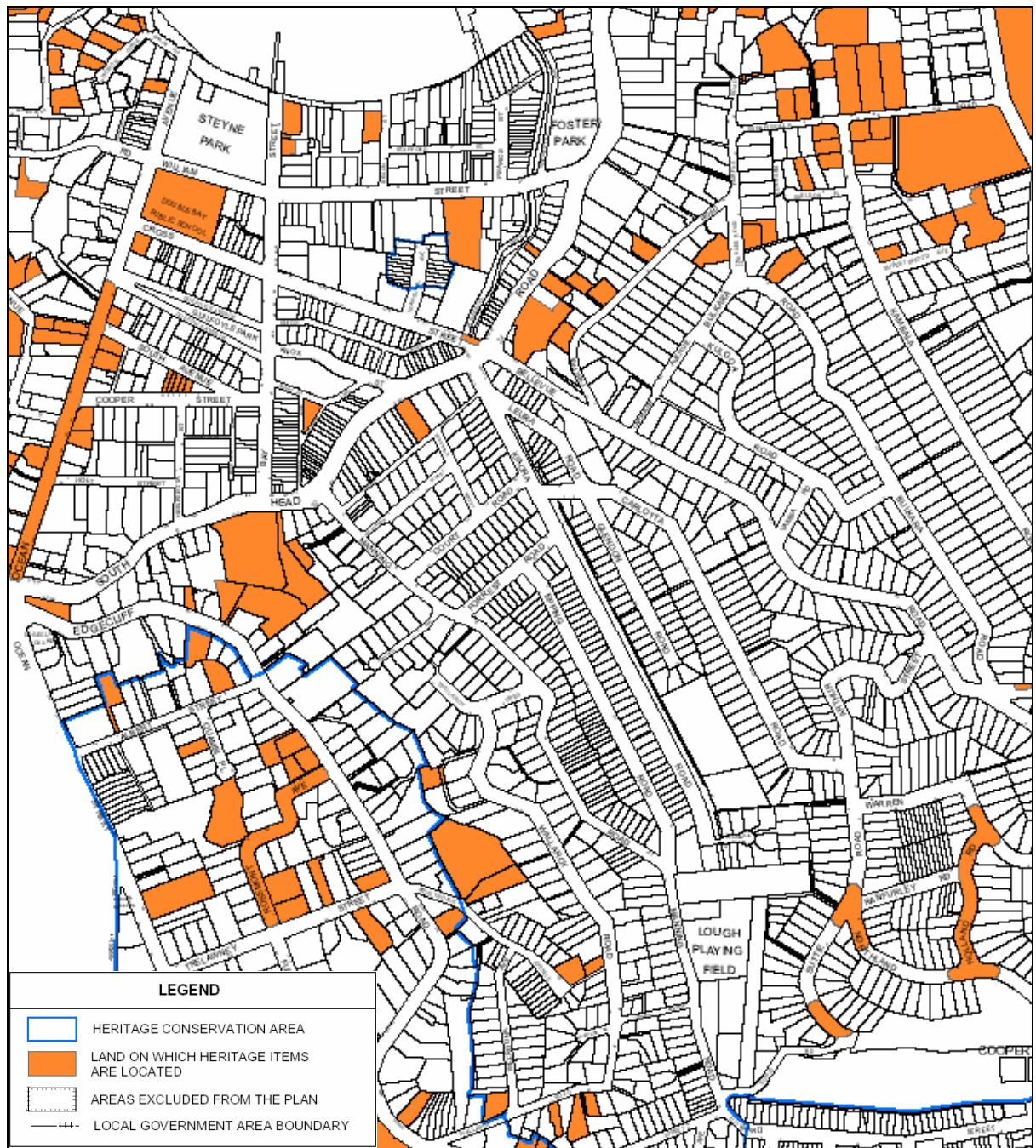


FIGURE 2.4 – Heritage Conservation
 Source: Woollahra LEP 1995 (map dated 10 May 2006)

3. COMMUNITY CONSULTATION

3.1 CONSULTATION PROCESS

The success of any floodplain management plan hinges on its acceptance by the local community and other stakeholders. This can only be achieved by involving the local community at all stages of the decision-making process.

Community consultation has been an important component of the current study, through meetings of the Floodplain Management Committee, questionnaires and public exhibition of the draft report. The consultation has aimed to inform the community about the development of the floodplain management study and its likely outcomes, and provided an opportunity to collect feedback and ideas on potential floodplain management measures.

The key elements of the consultation process have been as follows:

- ▶ Meetings of the Floodplain Management Committee;
- ▶ Project web-site;
- ▶ Community information sheet;
- ▶ Community questionnaire;
- ▶ Agency and interest group questionnaire; and
- ▶ Public exhibition of the draft FRMP.

3.2 FLOODPLAIN MANAGEMENT COMMITTEE

The study has been overseen by Woollahra Council's Floodplain Management Committee. This committee comprises representatives from:

- ▶ Woollahra Municipal Council;
- ▶ Office of Environment and Heritage (OEH);
- ▶ Waverley-Woollahra State Emergency Service;
- ▶ Sydney Water; and
- ▶ Double Bay Residents' Association.

The Committee has met regularly to hear progress reports by the consultant, and to provide direction as the study progressed. The Committee has provided a valuable mechanism for the views of many interested parties to be represented. The main agenda items at each meeting are summarised in **Table 3.1**.

TABLE 3.1 – Meetings of Woollahra Council's Floodplain Management Committee
(relevant to the *Double Bay Catchment FRMS&P*)

DATE OF MEETING	MAIN AGENDA ITEMS
11 Mar 2009	Introduction to study; identification of flooding "hot-spots"
21 Jul 2010	Review of community consultation, blockage and climate change model runs, damages assessment, options assessment
16 Mar 2011	Review of draft report, options assessment

3.3 PROJECT WEB-SITE

A study web-site was developed, containing information and contact details. The site was located at www.bewsher.com.au/studies-doublebay.html.

3.4 COMMUNITY INFORMATION SHEET

In September 2009, a double-sided A3 information sheet was sent to about 1,300 property owners and tenants located within the 100 year flood extent, derived from the *Double Bay Catchment Flood Study*. The newsletter is included in **Appendix B**. The newsletter performed a variety of functions: it introduced readers to the study; it reminded them that flooding has been problematic in their area; it flagged potential management strategies; and it encouraged residents to participate in the study.

3.5 COMMUNITY QUESTIONNAIRE

Accompanying the information sheet was a community questionnaire (see **Appendix B**), from which 56 responses were received (48 residential, 8 commercial).

3.5.1 Flood Problem Areas

One question asked respondents to identify areas where flood problems had been experienced in the past. The identified locations are shown on **Figure 3.1**. Several respondents described “rivers” of water flowing off the hill sides around Double Bay after heavy rain, and one described the flow down a staircase as being “like Niagara Falls”. The areas identified generally correspond closely to the problem areas modelled in the *Double Bay Catchment Flood Study* (Bewsher Consulting, 2008).

3.5.2 Floodplain Management Measures

A particular goal of the questionnaires was to canvass the community’s ideas about how to manage the flood problem. The number of responses for each measure suggested is shown in **Figure 3.2**. It is seen that the most popular request was for frequent and regular cleaning of drains and street-sweeping to prevent the road drainage infrastructure from blocking and thereby diverting overland flow through private property. Related to this idea were calls for the removal of trees with invasive root systems such as camphor laurel and ficus. The careful design of drainage grates to minimise the potential for blockage was also described.

Another popular suggestion was for actual enhancements to the drainage infrastructure including more pits and larger pipes. Two areas specifically mentioned were the laneway between 19 and 21 Wallaroy Road and the eastern end of Guilfoyle Park.

Other suggested options include:

- 1) regrading of streets and footpaths so that rainwater is encouraged to drain towards the street;
- 2) stormwater harvesting and applying Water Sensitive Urban Design (WSUD) techniques in order to reduce runoff;
- 3) increasing the capacity of the Lough Park detention basin;
- 4) constructing a sea wall to prevent the inundation of Beach Street during high tides;
- 5) applying appropriate development controls; and
- 6) preparing emergency management plans.

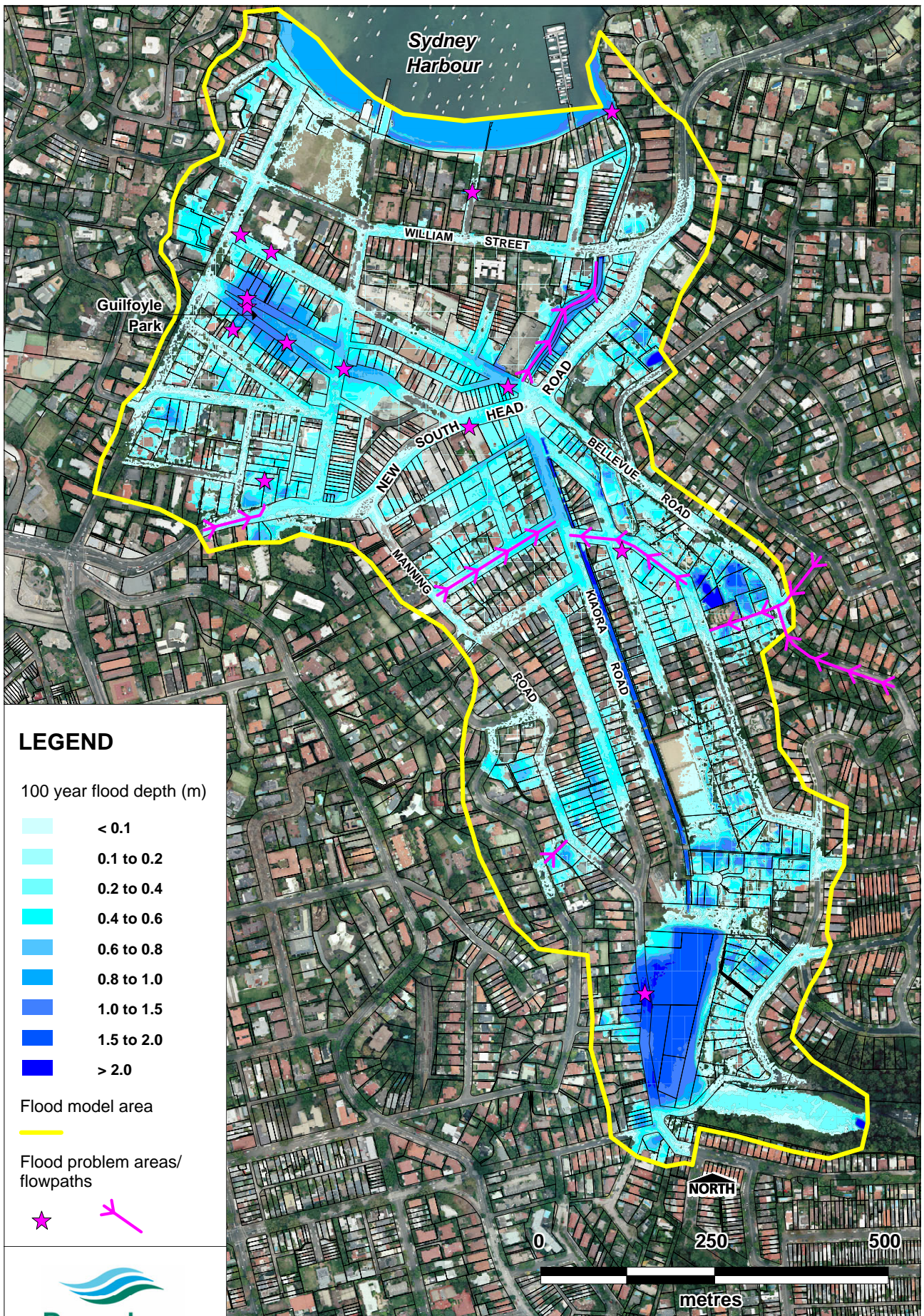


FIGURE 3.1 - Flood Problem Areas Identified from Community Questionnaire

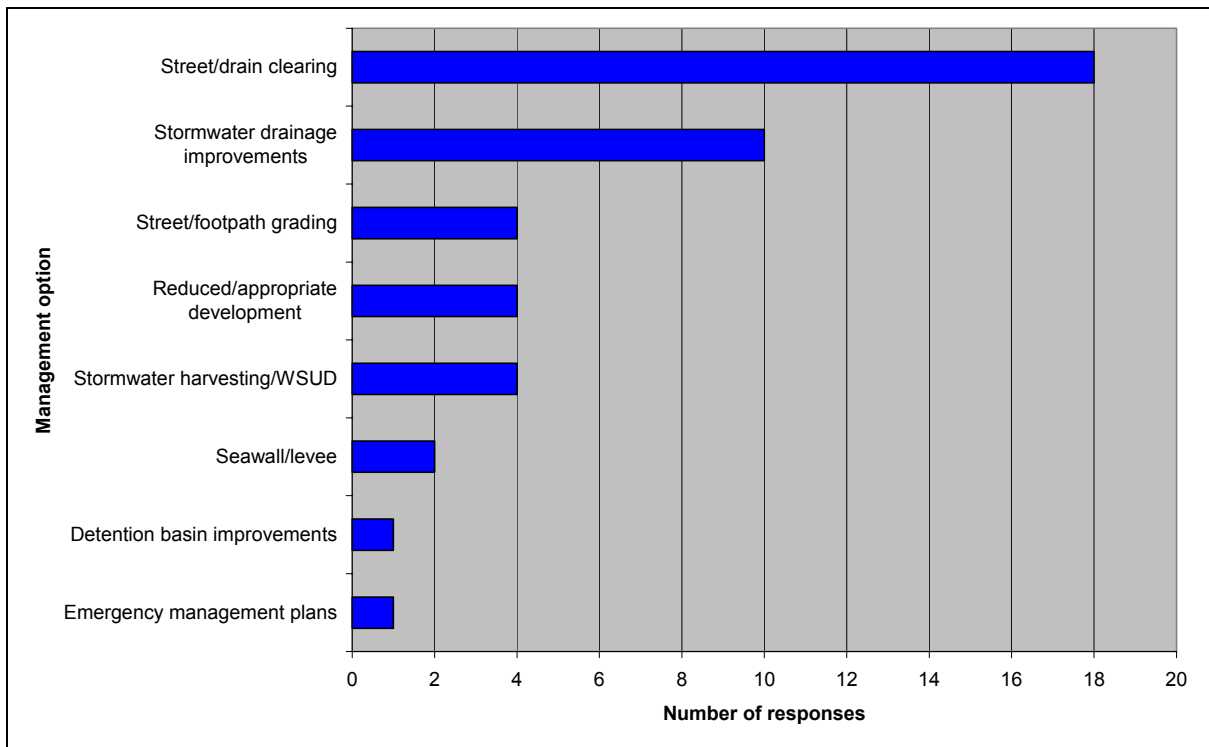


FIGURE 3.2 – Community Views on Solutions to Flood Problem (N=56)

3.5.3 Other Issues for Consideration

A few respondents called for changes to the Sydney Water channels, mainly for reasons not related to flooding. One respondent called for “beautification”; another for “naturalisation”; while another called for the open channel to be covered to confine the odour, to limit the breeding of mosquitoes, and to remove a hazard for children.

Concerns were expressed about the potential effects of climate change and rising sea levels, as well as existing erosion problems at the stormwater outlet on Double Bay beach.

3.5.4 Potential Flood Damages

An unusual question was included in the questionnaire in attempt to discern potential damages for a muddy flood reaching 0.3m over the floor of houses and businesses. The results are shown in **Table 3.2**. Based on the 39 responses received for houses, the median damage to contents for such a flood would be \$60-80K. This is compared to the figure calculated using the DECC (2007) *Residential Flood Damages Guideline* in **Section 5.3.1**. Of the seven responses received for the commercial sector, the large majority would have damage exceeding \$120K for such a flood.

TABLE 3.2 – Potential Damage for 0.3m Flood Depth

POTENTIAL DAMAGE	RESIDENTIAL	COMMERCIAL
<\$20K	6	1
\$20-40K	7	
\$40-60K	3	
\$60-80K	10	
\$80-100K	1	1
\$100-120K	5	
>\$120K	7	5

3.5.5 Disclosure

Another question sought to gauge the community’s views about methods of disclosing flood risk to the public. The results are shown in **Figure 3.3**. Most respondents believed that Council should issue flood advice, and the provision of flood maps on Council’s web-site or their availability at Council’s office, as well as the provision of flood level certificates on request, were all well supported. There was little support, and significant opposition, to the idea of regularly issuing flood level certificates to property owners. (Council’s current policy is not to provide flood notifications with the exception of S149 certificates, which indicate whether a property is in a flood study area).

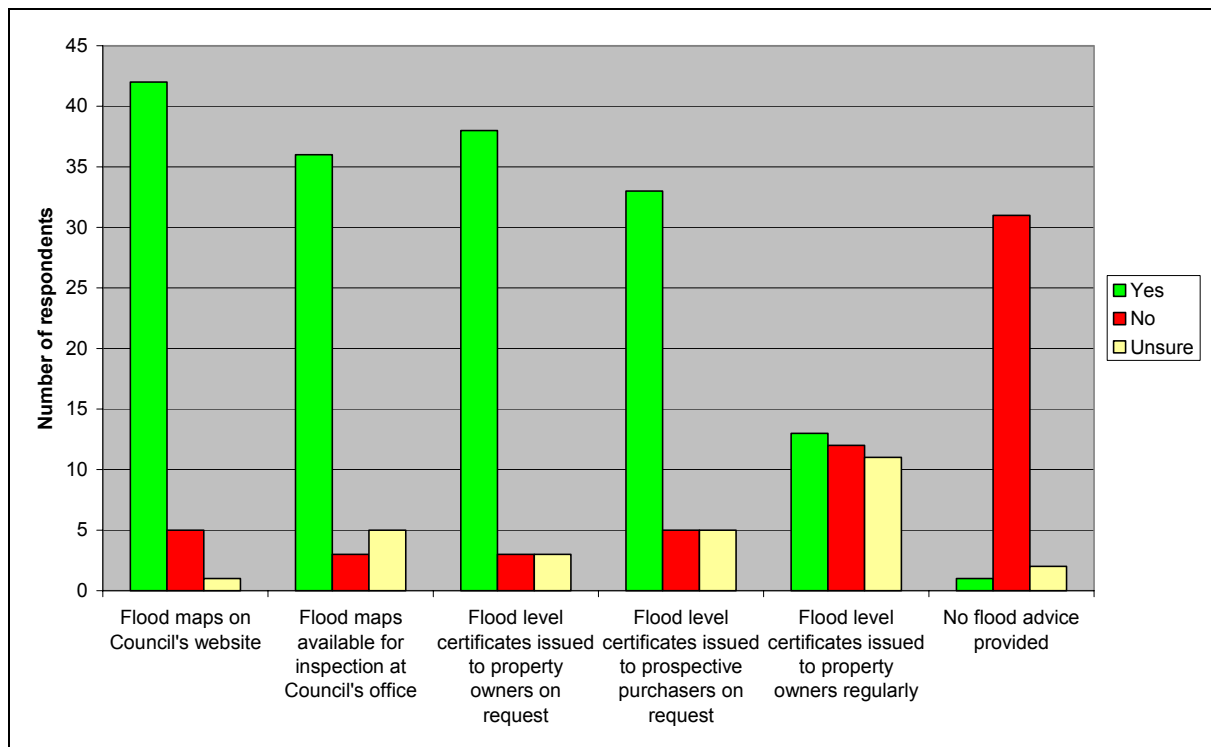


FIGURE 3.3 – Community Views on Disclosure of Flood Information (N=56)

3.6 AGENCY QUESTIONNAIRE

In September 2009, individually tailored questionnaires, along with a copy of the newsletter and a map of the catchment showing the maximum area subject to inundation, were issued to selected agencies and interest groups, listed in **Table 3.3**. The questionnaire is attached at **Appendix B**.

Only a few responses were received, though it is noted that some other organisations are also represented on the Floodplain Management Committee and use that forum to provide input to the study. The Bureau of Meteorology noted the existence of a real-time rain gauge at Rose Bay (see www.bom.gov.au/hydro/flood/nsw/sydney_metro.shtml). However, it was noted that there is scope for further gauges. It was suggested that as a rule of thumb, >60mm rain in 1-2 hours is likely to cause flooding.

TABLE 3.3 – Liaison with Agencies and Interest Groups

ORGANISATION	RESPONSE
Bureau of Meteorology	Phone call
Double Bay Partnership Inc	
NSW Department of Primary Industries (Fisheries)	Survey
Office of Environment and Heritage	
Roads and Traffic Authority	
State Emergency Service (Sydney Southern Region)	
Sydney Water Corporation Ltd	

3.7 PUBLIC EXHIBITION

The final stage of the community consultation for this study was the public exhibition of the draft *Double Bay Catchment FRMS&P*. The document was placed on exhibition from 9 May 2011 until 3 June 2011. Some 3,300 community information sheets (see **Appendix B**) were delivered to inform residents in the flood-affected areas of the exhibition, and to invite comments. Council received a few verbal general inquires but no written submissions and therefore no changes or amendments to the plan were required.