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<b>C10.3</b>	<b>Minutes of the Avalon to Palm Beach Floodplain Risk Management Study &amp; Plan Community Working Group held on 5 March 2015</b>
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**Meeting:** Natural Environment Committee

**Date:** 07 April 2015

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**COMMUNITY STRATEGIC PLAN STRATEGY:** Disaster, Emergency & Risk Management

**COMMUNITY STRATEGIC PLAN OBJECTIVE:**

- To promote a well-informed community and that the Council knows how to effectively respond to disaster and emergency situations before during and after
- To effectively respond to disasters, emergency situations and provide effective relief measures
- To work effectively with all emergency and utility agencies to improve emergency response
- To increase community awareness on effective risk management
- To plan for risks due to natural and manmade hazards

**DELIVERY PROGRAM ACTION:**

- Develop and implement programs to increase resilience to flood and coastal storms
  - Develop, review and implement flood and coastal storm risk studies and plans in accordance with NSW Government guidelines
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**1.0 EXECUTIVE SUMMARY**

**1.1 SUMMARY**

1. The flood Working Group provides advice in the preparation of the Avalon to Palm Beach Floodplain Risk Management Study & Plan.
  2. Minutes of the 2<sup>nd</sup> meeting of the working group incorporating an update of the flood model review, community flood survey findings, and preliminary findings from the flood damaged assessment.
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**2.0 RECOMMENDATION**

**That the information provided in the report on the Minutes of the 2<sup>nd</sup> meeting of the Avalon to Palm Beach Floodplain Risk Management Study and Plan Working Group be noted.**

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**3.0 BACKGROUND**

**3.1 PURPOSE**

To consider the draft minutes of the Avalon to Palm Beach Floodplain Risk Management Study & Plan (FRMS&P) Working Group meeting held at the Avalon Annexe on 5 March 2015 (refer **Attachment 1**).

### **3.2 BACKGROUND**

- The Avalon to Palm Beach Floodplain Risk Management Study and Plan (FRMS&P) Working Group is a forum that assists Pittwater Council in the preparation, development and implementation of floodplain management plans for all flood prone properties between Bilgola Beach to the South to Palm Beach in the North. The Working Group is administered by Pittwater Council.
- The formation of the Floodplain Working group by Council is the first formal step in the Floodplain Management Process, as outlines in the NSW Government's Floodplain Development Manual.
- The primary function of this working group is to be an advisory body to Council on matters concerning the development, implementation and review of the Avalon to Palm Beach Floodplain Risk Management Study and Plan. The working group meetings provide a forum for the discussions between Council staff, local residents, interested groups and government authorities on technical, social, economic, environmental and cultural issues.

### **3.3 POLICY IMPLICATIONS**

- Nil

### **3.4 RELATED LEGISLATION**

NSW Government Flood Prone Land Policy and Floodplain Development Manual (2005)

### **3.5 FINANCIAL ISSUES**

#### **3.5.1 Budget**

- Nil

#### **3.5.2 Resources Implications**

- Nil

## **4.0 KEY ISSUES**

Pittwater Council is continuing the next stages of the Floodplain Management Process with the Avalon to Palm Beach Floodplain Risk Management Study and Plan to identify possible flood mitigation and management options for the study area.

The study area covers the suburbs of Bilgola Beach, Bilgola Plateau, Clareville, Avalon Beach, Whale Beach and Palm Beach. This floodplain Risk Management Study and Plan follows on from the 2013 Careel Creek Catchment Flood Study (WMA Water) and the 2013 Overland Flow Mapping and Flood Study (Cardno) for the study area.

NSW Public Works (Manly Hydraulics Laboratory), a company specialising in flooding and floodplain risk management, is currently undertaking the study.

Under the NSW Government Flood Prone Land Policy, management of flood prone land is primarily the responsibility of councils. The Floodplain Management Process that councils follow in order to identify, understand and manage flood risk is outlined below:

- The Flood Study (completed) defines the nature and extent of the flood problem.
- The Floodplain Risk Management Study (current stage) assesses management options with respect to existing and proposed development.
- The Floodplain Risk management Plan (current stage) provides Council with a management plan for the floodplain, and is often undertaken in conjunction with the Floodplain Risk Management Study.
- Implementation of the Plan involves enacting the recommendations of the Floodplain Risk Management Plan to mitigate flood risks to life and property.

Community consultation is an important component of the Avalon to Palm Beach Floodplain Risk Management Study and Plan. The local knowledge of residents' and business operators' personal experiences of flooding are an important source of information.

There are a number of ways Council is engaging with the owners of flood prone land in the study area:

- Through an online questionnaire. The questionnaire greatly assists in collating people's knowledge and experience about previous flooding history and existing flood problem areas.
- A Community Working Group has been formed from self-nominated community representations.
- A website has been established to keep the community informed on the study progress.

Avalon to Palm Beach FRMS&P Update – A verbal update by MHL (NSW Public Works) was provided on the progress of the Floodplain Risk Management Study and Plan.

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## **5.0 ATTACHMENTS**

- **ATTACHMENT 1:** Draft minutes of the Avalon to Palm Beach Floodplain Risk Management Study & Plan Working Group Meeting on 05 March 2015

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## **6.0 SUSTAINABILITY ASSESSMENT**

A sustainability assessment is not required for Minutes of Meetings.

Report prepared by  
Melanie Schwecke, A/Principal Officer – Floodplain Management

Jennifer Pang  
**MANAGER, CATCHMENT MANAGEMENT & CLIMATE CHANGE**



## **DRAFT Minutes**

### **Avalon to Palm Beach Floodplain Risk Management Study and Plan Working Group**

Held in Avalon Annexe, Avalon Recreation Centre,  
Old Barrenjoey Road on

**05 March 2015**

Meeting commenced at 4:05 pm

<b>AVALON TO PALM BEACH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN COMMUNITY WORKING GROUP</b>	
<b>Established</b>	5 May 2014
<b>Function</b>	To enable community participation during the preparation of the Avalon to Palm Beach Floodplain Risk Management Study and Plan in accordance with the NSW Government's Floodplain Development Manual (2005).
<b>Composition/Membership for each Community Working Group:</b>  Notes:  Tenure of membership of community representatives is up to the completion of the Floodplain Risk Management Study & Plan.	One (1) Councillor (who shall be Chairperson of Community Working Group) plus one (1) alternative councillor. All Councillors are invited to attend.  Up to five (5) community representatives who reside or work within the flood-affected areas identified by the Careel Creek Catchment Flood Study (WMAwater, July 2013) or the Pittwater Overland Flow Mapping and Flood Study (Cardno, October 2013).  Up to four (4) stakeholder representatives including: <ul style="list-style-type: none"> <li>Up to three (3) representatives from Pittwater community groups, subject to the group's inclusion on Councils "Register of Community Groups";</li> <li>Local industry representatives;</li> </ul> Interested observers are invited to attend.
<b>Advisors:</b>	State Government representatives as required, including: <ul style="list-style-type: none"> <li>Office of Environment and Heritage</li> <li>State Emergency Service (representing State Headquarters, Region Controller and Local Controller)</li> <li>Department of Primary Industries (Catchments &amp; Lands)</li> <li>Sydney Water</li> <li>Department of Planning &amp; Infrastructure.</li> </ul>
<b>Council Officers:</b>	Manager, Catchment Management and Climate Change (or nominee) Manager, Urban Infrastructure (or nominee)
<b>Quorum:</b>	Five (5) members provided one is a Councillor, two Community representatives and one NSW Government representative.
<b>Reporting Procedures:</b>	To be reported to Council as required.
<b>Responsible Business Unit:</b>	Catchment Management and Climate Change
<b>Meetings:</b>	At least twice during the preparation of the Floodplain Risk Management Study & Plan.
<b>Council Members Appointed:</b>	Cr McTaggart (delegate) Cr Grace (alternative delegate)

**Members of the Working Group namely**

**Pittwater Council Members**

Cr Alex McTaggart (Chairperson)  
Cr Bob Grace (Delegate)

**Citizen Representatives**

Mr Roger Alsop  
Mr Allen Telling  
Mr Stuart Davidson  
Mr Vince Nicholson

**Stakeholder Representatives**

Mr John Warburton (Palm Beach – Whale Beach Residents Association)  
Mr Stephen Branch (Avalon Beach Village Chamber of Commerce inc)  
Ms Kerry Mc Ewan (Barrenjoey High School)  
Mr Spiro Daher (Narrabeen Lagoon Floodplain Risk Management Working Group Member)

**State Government Representatives**

NSW Office of Environment and Heritage (OEH)  
State Emergency Service – Warringah/Pittwater Unit  
State Emergency Service – Sydney Northern Region  
Sydney Water  
Roads and Maritime Services

**and the following Council Advisors**

Manager, Catchment Management and Climate Change  
Principal Officer – Floodplain Management

**are requested to be in attendance.**

**Copies to:**

Director – Urban & Environment Assets – Mr Chris Hunt  
Manager – Urban Infrastructure – Mr Mark Shaw  
Risk Officer – Ms Marnie VanDyk  
EA to General Manager - Ms Fiona Garrity  
EA to Mayor and Councillors – Ms Kim Reading

All other Councillors are free to attend as Observers, and are invited to do so and to engage in discussion

## **Attendance:**

### **Pittwater Council Members**

Cr Alex McTaggart (Chair)

### **Citizen Representatives & Stakeholder Representatives**

Roger Alsop  
Allen Telling  
Vince Nicholson  
John Warburton  
Spiro Daher

### **State Government Representatives**

Greg Davis (Office of Environment and Heritage)  
Wayne Lyne (NSW SES – Warringah/Pittwater Unit)  
Lynn Larri (NSW SES – Warringah/Pittwater Unit)

### **And the following Council Advisors**

Dr Melanie Schwecke (A/Principal Officer – Floodplain Management)  
Melanie Thomas (Climate Change Adaptation Officer)

### **In attendance**

Bronson McPherson – Consultant – MHL/ NSW Public Works  
Leon Collins – Consultant – MHL/ NSW Public Works

## **1.0 APOLOGIES**

Stuart Davidson (Citizen representative)  
Stephen Branch (Avalon Beach Village Chamber of Commerce inc)  
Kerry Mc Ewan (Barrenjoey High School)  
Allison Flaxman – NSW SES (Sydney Northern Region)  
Jennifer Pang (Manager Catchment Management and Climate Change)  
Roads and Maritime Services  
Sydney Water

## **2.0 DECLARATION OF PECUNIARY AND CONFLICTS OF INTEREST**

Nil

## **3.0 CONFIRMATION OF MINUTES OF PREVIOUS MEETING**

Confirmation of the minutes from the working group meeting held on the 30 October 2014:

*Moved by Spiro Daher*

*Seconded by Allen Telling*

## **4.0 MATTERS ARISING FROM PREVIOUS MEETING**

Discussion was had regarding a number of flood issues identified in Avalon:

- Mr Allen Telling asked of how the issue of landscaping works by property owners on flood prone land not being monitored by Council was being addressed. Melanie Schwecke noted that it was difficult because there are no planning requirements to lodge a development application or complying development certificate into Council for landscaping or control mechanisms to implement.
- Cr Alex McTaggart noted other related issues as mulch being washed into the pit and blocking drainage capacity.
- Melanie Schwecke noted that letters were sent to the schools identified as located in flood prone areas with no response received

## **5.0 COMMITTEE BUSINESS**

### **5.1 AVALON TO PALM BEACH FRMS&P**

A verbal update along with presentation was given by Bronson McPherson and Leon Collins (MHL – NSW Public Works). This presentation is provided in Attachment 1.

Several questions were discussed, these included:

Q: Cr Alex McTaggart asked what are the typical lag co-efficient?

A: Leon Collins responded that studies in Australia have been undertaken that establish correlations between land types and impacts on flood behaviour.

Melanie Schwecke noted that the 2002 Careel Creek Flood Study was only undertaken in 1D but that the current study was undertaken in 2D which enables the topography and local surface to be input into the model. Leon Collins also noted that historically modellers had to guess the pathway of the flood whereas 2D hydrological modelling is now used for obtaining greater accuracy, particularly in urban areas.

Q: Cr Alex McTaggart asked the size of the grid that was used in the 2D modelling.

A: Leon Collins specified that it was a 3m x 3m grid.



Q: Cr Alex McTaggart asked where rainfall was monitored in Avalon.

A: Leon Collins responded that there was a gauge located in Avalon.

Q: Allen Telling asked whether this flood modelling was a description of what was undertaken in the previous study.

A: Leon Collins clarified that the flood modelling was updated in this study so that the entire catchment was modelled to a 3m grid and that the approach had been extended in order to undertake the Flood Risk Management Study & Plan.

Bronson McPherson noted that previously the computer software wasn't big enough to compute more complex modelling and that the development of Google has also assisted with modelling.

Leon Collins added that other aspects incorporated into this flood model were overland flows and tidal impacts on flooding were considered. Additionally pits and pipes were incorporated.

Q: Allen Telling would there be any differences in properties tagged under the 2013 Avalon to Palm Beach Flood Study.

A: Melanie Schwecke noted that it was likely there would be some minor changes.

Q: John Warburton asked how many surveys were undertaken.

A: Bronson McPherson explained that the survey was undertaken by contacting businesses through the Chamber of Commerce to ensure a widespread coverage.

A: Melanie Schwecke highlighted that the business and community surveys were still open for responses.

Q: Cr Alex McTaggart asked what the process would be on the next phase of the development of the Floodplain Risk Management Study & Plan.

A: Melanie Schwecke explained that mitigation options would be test through the model to see the impacts in order to come up with a suite of mitigation options that would be released as a management plan for public exhibition. Melanie Schwecke noted that public exhibition was intended at the beginning of 2016.

#### **WORKING GROUP RECOMMENDATION**

- The working group note the information presented by MHL – NSW Public Works.

#### **6.0 GENERAL BUSINESS**

Cr Alex McTaggart closed the meeting with congratulations to the consultants and Floodplain Management Officer on the high standard and quality of the study presented noting that he could see the progress from his experience on previous flood study committees.

#### **6.0 NEXT MEETING**

The Chair thanked everyone for their participation in this very effective forum and requested that the next meeting be scheduled for 4 June 2015 from 4pm to 6pm at Avalon Recreation Centre – Avalon Annexe (Old Avalon Scout Hall)

*There being no further business the meeting concluded at 6.00pm.*

## ATTACHMENT 1

18/03/2015

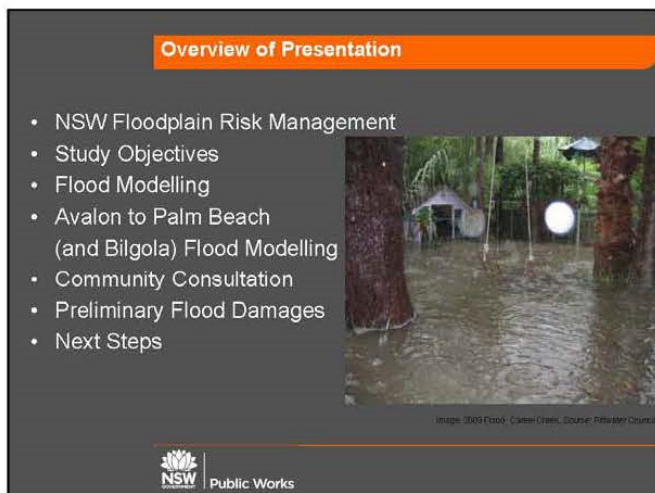


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A division of the Department of Finance & Services

**Avalon to Palm Beach Floodplain Risk Management Study  
and Plan Working Group**

Bronson McPherson – Project Manager  
Leon Collins – Modeller  
Stephen Yeo – FRM specialist  
Drew Bewsher – Technical advisor

5 March 2015



**Overview of Presentation**

- NSW Floodplain Risk Management
- Study Objectives
- Flood Modelling
- Avalon to Palm Beach  
(and Bilgola) Flood Modelling
- Community Consultation
- Preliminary Flood Damages
- Next Steps

Image: 2005 Flood, Cullen Creek, Source: Pittwater Council

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**Aim of Flood Risk Management**

- Reduce the social and financial costs from the risks associated with occupying the floodplain
- Increase the sustainable benefits of using the floodplain
- Improve and maintain flood plain ecosystems dependent on flood inundation



Source: Floodplain Development Manual

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**Why worry about flood risk?**

- Munich RE: Fatalities due to floods in 2013: 10,000 people.
- Global economic losses from flooding in 2013: US\$50 billion



Flooding in central Europe (2013)

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**Flood Risk in NSW**

- Most costly natural disaster in Australia:
  - \$200 - \$250 m flood damage on average every year in NSW
  - 100,000 buildings at risk from flooding in NSW
- Most manageable of all natural disasters:
  - we can work out where
  - we just don't know when

Image: Floodwaters cut off a road at Billinudgel, west of Brunswick Heads, on the NSW north coast  
Source: [abc.net.au](http://abc.net.au)

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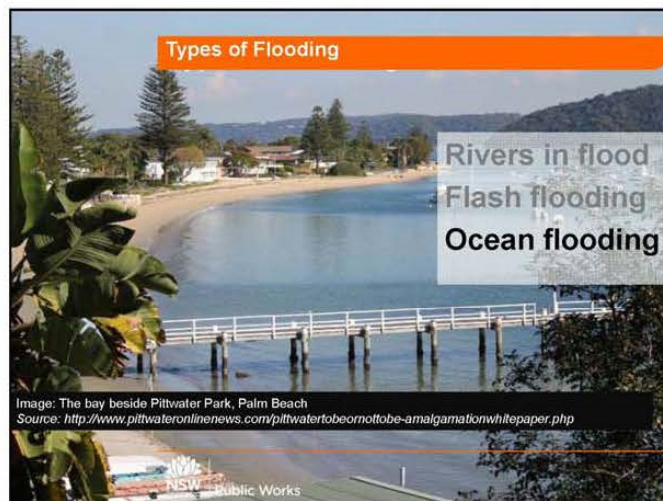


**Types of Flooding**

- Rivers in flood
- Flash flooding
- Ocean flooding

Image: South Australia's outback comes to life as water floods into Lake Eyre  
Source: <http://www.abc.net.au/news/2015-01-19/lake-eyre-floods/6025796>

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### Flood Risk Management Approach

- Understanding the local flood situation and its impacts on the community
- Identify flood mitigation measures and their limitations
- Evaluate flood mitigation measures

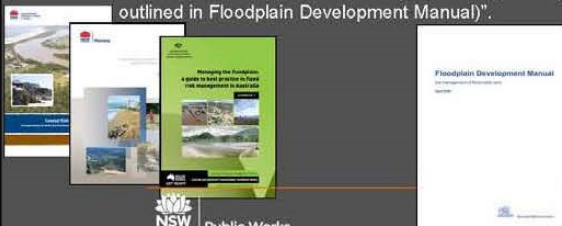



Image: 2008 Flood 2yr to 5yr ARI – Careel Creek Culvert, Source: Pittwater Council

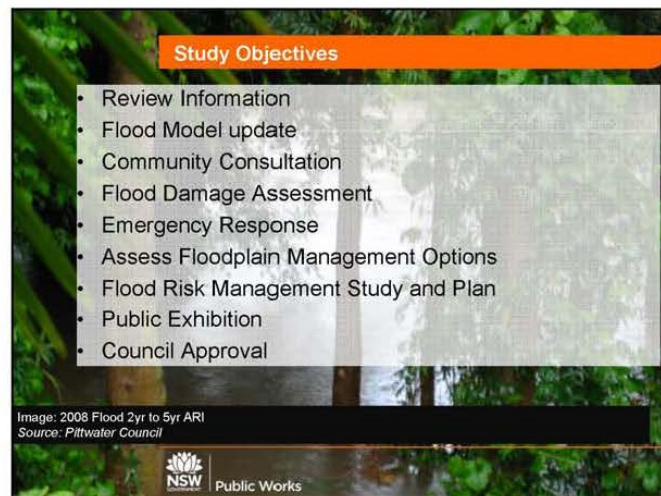
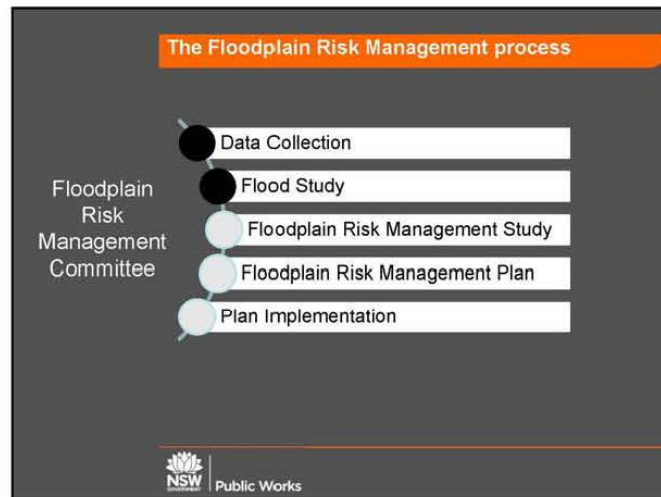


### Flood management in NSW?

- NSW Government Flood Prone Land Policy (1984):
  - management of flood prone land is primarily responsibility of local councils
- Section 733 of NSW Local Government Act, 1993
  - "provides Councils, statutory authorities and their staff with indemnity for decisions made and information provided in good faith from the outcome of the floodplain management process (as outlined in Floodplain Development Manual)".










### Flood Modelling

Modern computer modelling:

- Economic / practical
- Reliable when used carefully
  - Simplifies complex systems
  - Quality of input data
  - Modeller assumptions
  - Calibration / verification
- Suitable for purpose
  - Assess risk
  - Inform floodplain management


Best tool available!







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### Modelling Approaches





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### Previous Studies & Model Update

**Careel Creek Catchment Flood Study (WMA 2013)**


- WBNM hydrology model (rainfall > flows)
- TUFLOW hydraulic model (flows > levels, velocities, extents)
- Issues: catchment boundaries, assumptions in flow application > influences flow paths



**Pittwater Overland Flow Flood Study (Cardno 2013)**

- SOBEK hydrology and hydraulics (direct rainfall > flows, levels, velocities, extents)
- Issues: pit and pipe drainage network not represented, little-used software

**Updated Model – TUFLOW hydrology & hydraulics (direct rainfall)**

- Single model for entire study area
- Results directly comparable including assessment of mitigation options
- Previous issues resolved.



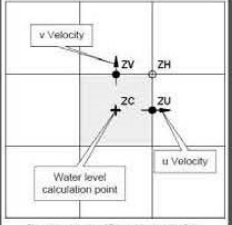





### TUFLOW

Most widely used software in Australia & UK

Suitable for study area:

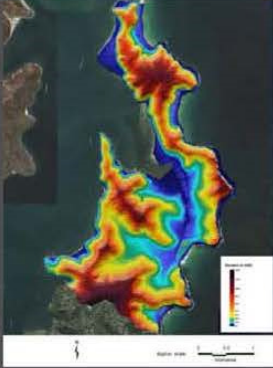
- Accurate 2D representation of topography (from ALS data)
- Direct rainfall identifies complex flow paths
- Integrated investigation of overland, mainstream & tide
- Stormwater drainage system representation
- Easily modified to investigate mitigation options




### Avalon to Palm Beach Model Data

- Council data
  - GIS (cadastre, LEP zoning, aerial photography)
  - Stormwater assets (drainage pits & pipes)
- Topographic data
  - Airborne Laser Scanning (ALS / LIDAR)
  - Detailed survey (creek cross-sections etc)
- Site inspection
  - Confirm flow paths, major drainage components, catchment conditions
- Existing Careel Creek model




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### Avalon to Palm Beach Model Setup

Series of GIS data layers read by TUFLOW

- 2D Model Domain – 3m square grid
  - Topography at 1.5m centres
- Boundary Conditions (tidal WL & rainfall)
- Hydraulic Roughness
- 1D Pits, Pipes, Culverts & Headwalls
- 1D channels Careel Creek & Ruskin Rowe
  - Improve representation of narrow sections


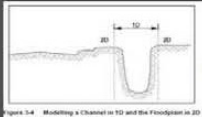
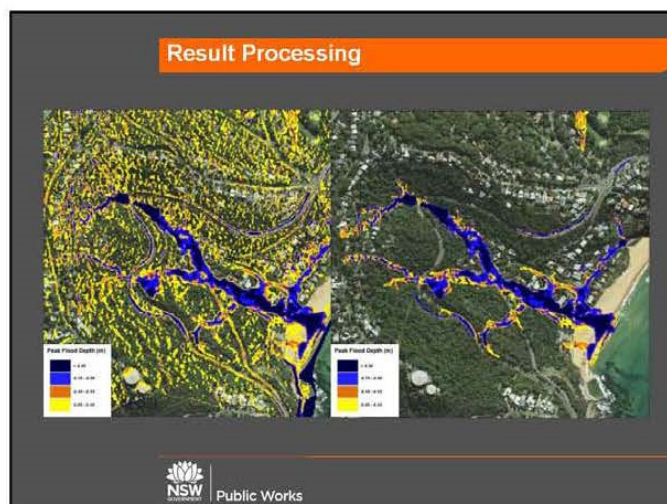
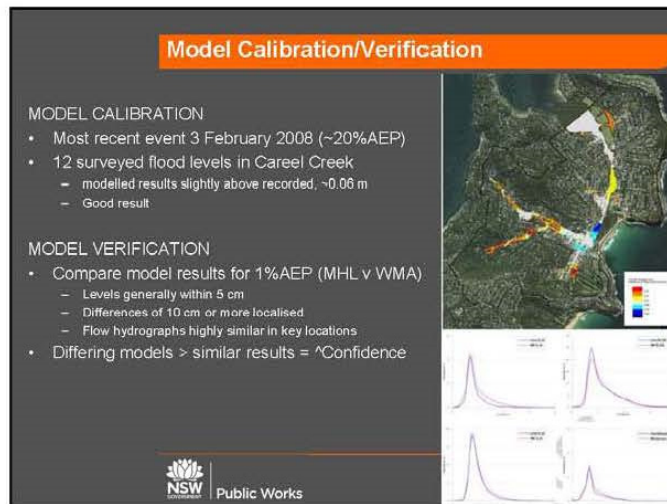
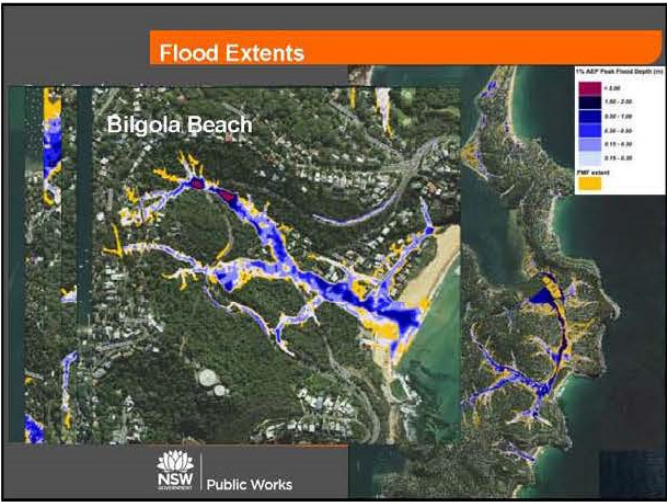
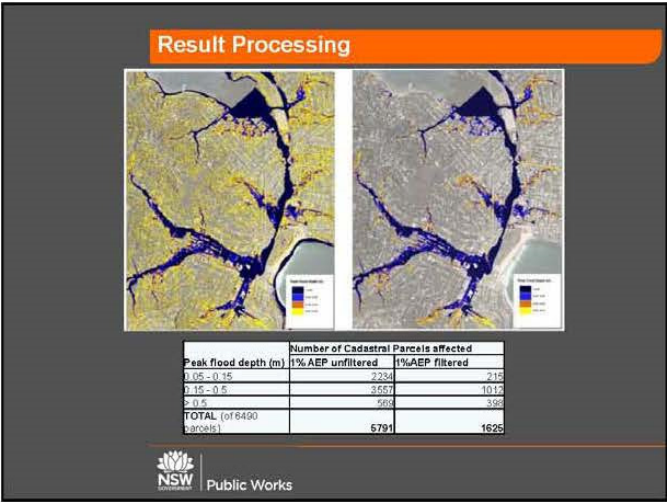
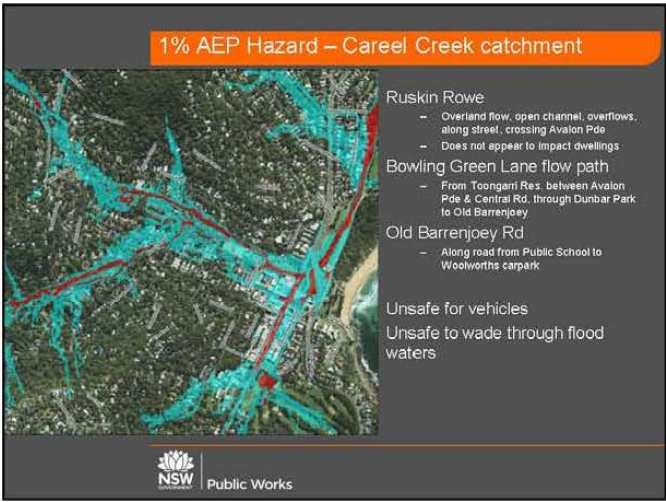
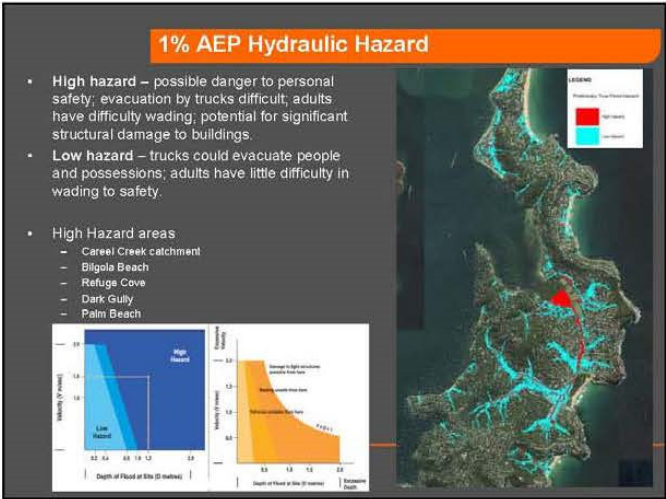



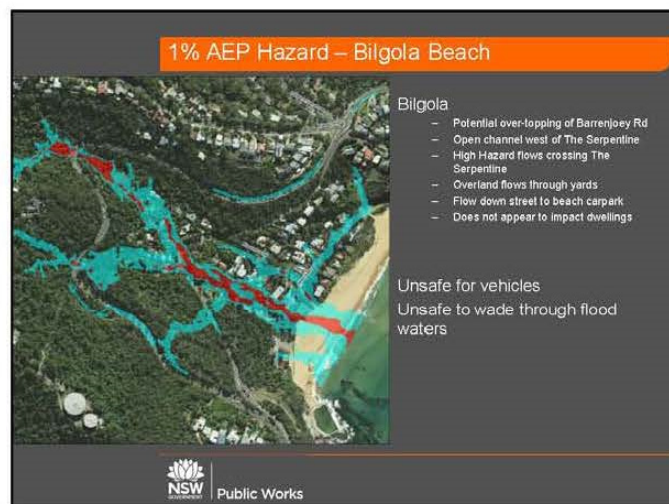
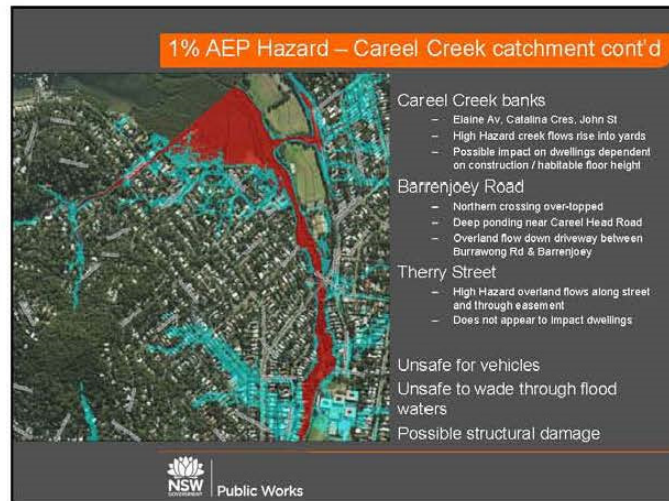
Figure 3.4 Modelling a Channel in 2D and the Floodplain as 2D

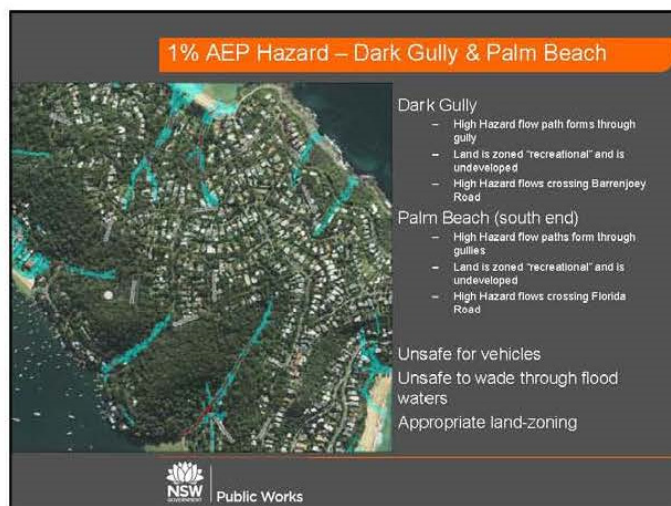
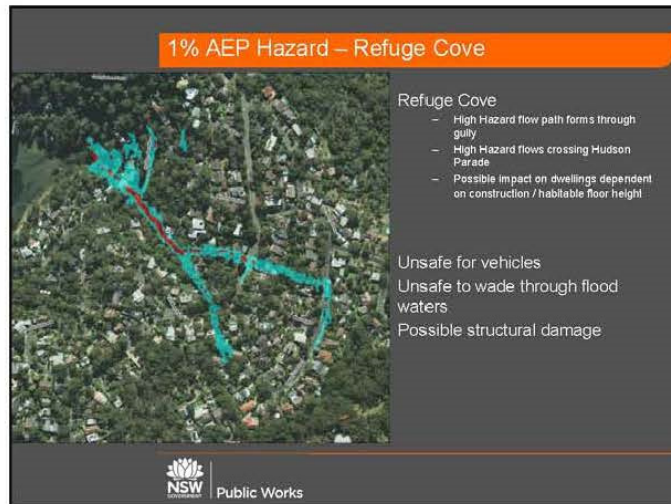












### Community Consultation

Community consultation included:

- Information on Council's website
- Community Flood Survey
- Business Flood survey

<https://www.surveymonkey.com/s/Avalon-PalmBeachFloodRiskBusiness>  
<https://www.surveymonkey.com/s/AvalonPalmBeach>



Image: Avalon CBD  
Source: Manly Daily

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### Community Survey Results 19 Responses

- Results
  - 6 responses were from people who were in that property prior to 1990
  - 1 noted they were flooded almost each year
  - 1 noted they were flooded in 2012 and 2013
  - 1 noted they were flooded in the 1970's
  - One noted that flooding to their property was due to blocked drains






Image: 1976 flood event  
Source: Avalon Beach Historical Society

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**Community Survey Results 19 Responses**

- Suggested options and comments
  - Regular checking of Careel Cr bed for large tree stems which might wash downstream and lead to blockage of culvert under Barrenjoey Rd Bridge
  - Questioned the efficacy of the latest channel mud removal
  - Enforcement of porous fencing on the floodplain
  - Reconsideration of the current program of mass planting of Careel Cr foreshore with species which create massive resistance to flows.




Image: 2008 flood event.  
Source: J. Cahill & W. Murphy

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**Business Survey Results – 13 Responses**

- 3 respondents noted there would be Major damage/disruption
- 2 responses suggested better drainage options should be investigated
- Over half did not know what mapped flood hazard was at their premises
- 2 responses indicated they would be interested in attending a business FloodSafe breakfast
- Over half of the respondents indicated interest developing a template flood emergency plan to help them assess and prepare for flooding at their business premises
- Almost all had taken some measure to prepare their business for flooding
- one responses noted they would like to see the flood hazard controls "dropped"

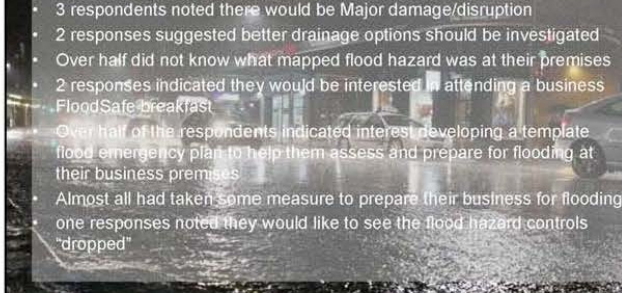



Image: "Flooding in Newtown as the storm cuts across Sydney's south"  
Source: <http://www.theaustralian.com.au/news/nation/hundreds-seek-help-as-torrential-rain-and-high-winds-batter-nsw/story-e6frg6rl-1227090774275>

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### Social Profile

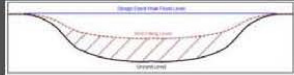
- 18% of the population that is 65 or over may be particularly vulnerable to the impacts of flooding
- 94% of persons speaking only English at home
- relatively high education levels and a capacity to absorb technical information (if well written).
- Median household incomes are \$1,798 per week which puts them about \$29,000 per annum above the NSW State median
- high proportion has multiple vehicles
- a low proportion of dwellings in the Avalon to Palm Beach statistical area do not have an internet connection



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### Cumulative Development Analysis

– Careel Creek Flood Study



1% AEP Peak flood levels are generally less than 0.1 m, with localised increases up to 0.2 m and some slight changes in flood extent for 50% scenarios.

Impacts from temporary obstructions or works that do not require Council consent will be unlikely to produce impacts greater than freeboard allowances for development.

If indiscriminate development is permitted in these areas, the flood fringe areas can be incrementally restricted over a period of many years, with the result that the obstruction ends up being greater than 50% compared to current conditions.

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### Damages Assessment – What and why

- One of the primary objectives of Flood Risk management in NSW is to reduce potential flood damage and personal danger in existing developed areas
- A damage assessment is a way to quantify flood damages

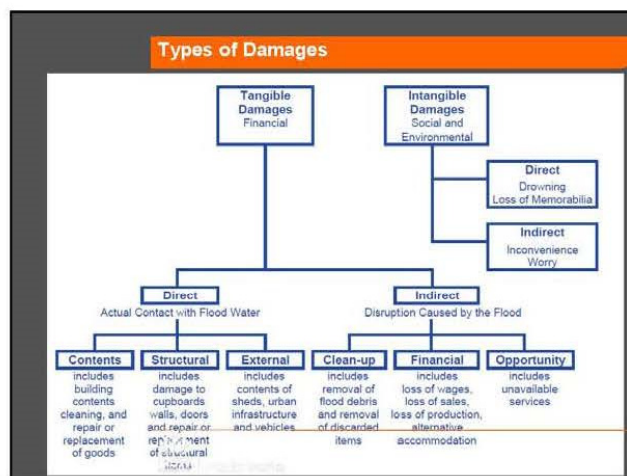


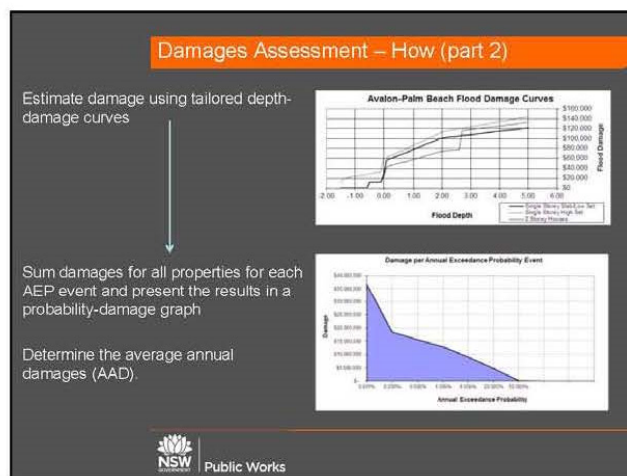
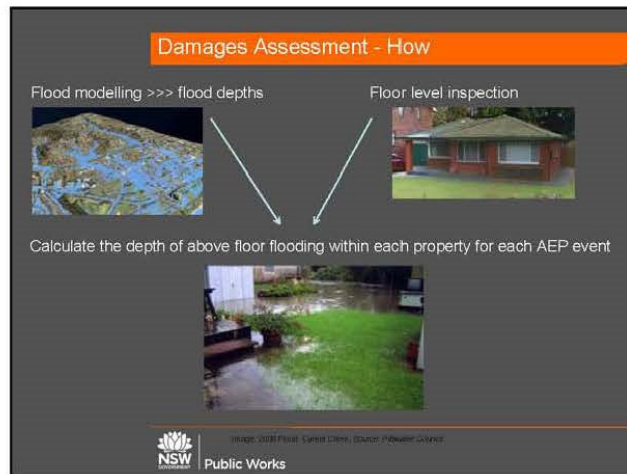
Image: 1976 flood event  
Source: Avalon Beach Historical Society



Image: 2008 flood event  
Source: J. Cahill & W. Murphy

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### Damages Assessment - Annual Average Damages

- Average annual damages (AAD) is also a convenient yardstick to compare the economic benefits of various proposed mitigation measures.
- For Example
  - a proposed house raising scheme reduces AAD by \$1M per year (Annual costs \$1M)
  - and a proposed levee reduces AAD by \$5 M per year (Annual costs \$40M)
- The levee is clearly more effective in reducing flood damages, it generates greater benefits than the proposed house raising scheme, but it also costs more to construct and maintain.






Image: 3600 Pinst. Canal Creek, Source: PWater Council

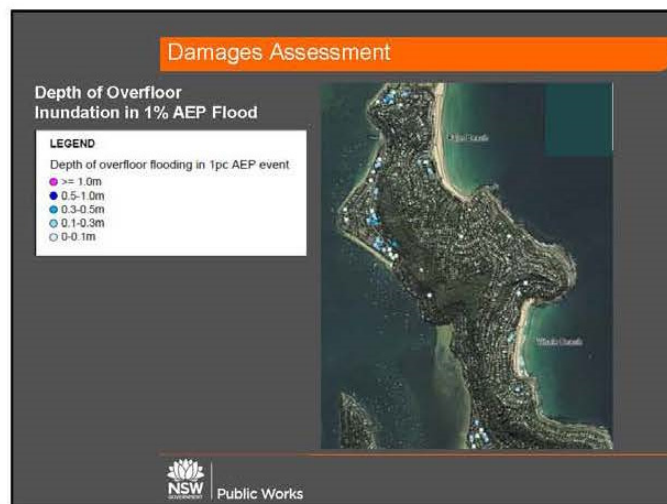
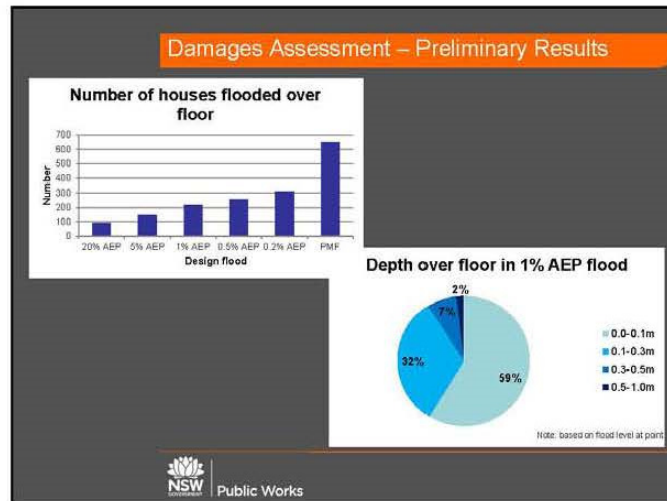

 Public Works

### Damages Assessment – Preliminary Results

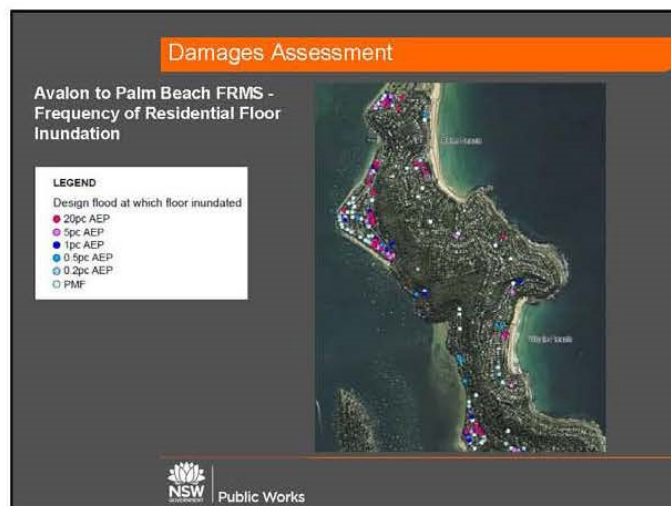
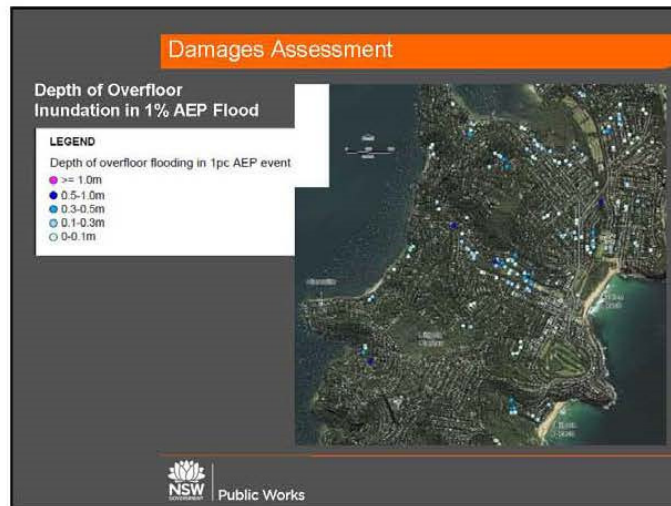
- Direct residential damages *only* assessed to date and some property data requires refinement.

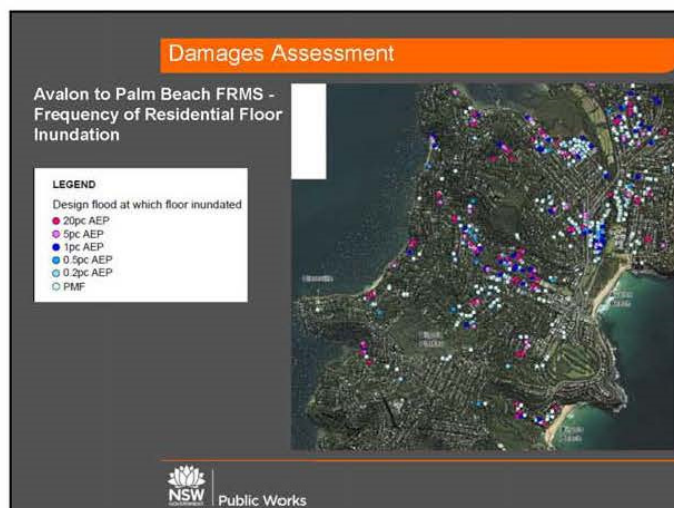
AEP	Damage
PMF	\$37M
0.2%	\$19M
0.5%	\$15M
1%	\$13M
5%	\$9M
20%	\$5M
<b>AAD</b>	<b>\$3.4M</b>


 Public Works



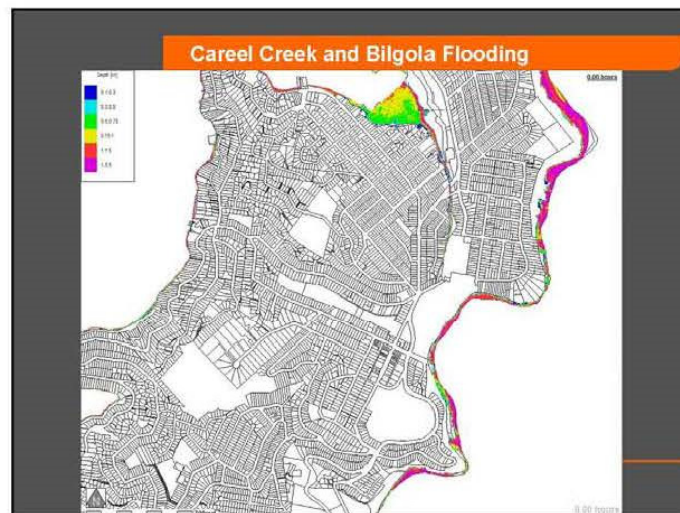












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## **Council Meeting**

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### **11.0          Adoption of Connecting Communities Committee Recommendations**

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### **12.0          Adoption of Natural Environment Committee Recommendations**