Pittwater Council's Approach to Overland Flow Management

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- Pittwater LGA is 125km²
- Pittwater is 45 min from the Sydney CBD
- Pittwater waterway covers an area of 20 km²
- Pittwater has 9 ocean beaches and 6 estuary beaches

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Why did Council undertake the study?

- Prior to the 2012 DRAFT Overland Flow Flood Study Council did not have a flood extent map of the locations of overland flow paths.

- Without this map all properties in Pittwater (not already identified as flood prone) were assigned an overland flow flood classification on their s149(5)

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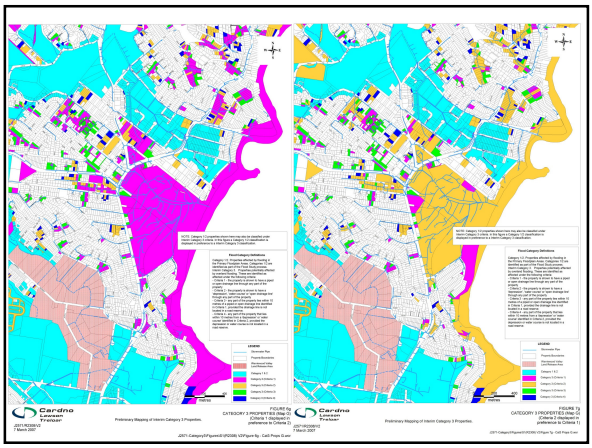
Staged approach?

- STAGE 1 – desktop analysis
  - ***Criteria 1*** — the property was shown to have a piped or open drainage line through any part of the property as shown on the 'pit and pipe layer';
  - ***Criteria 2*** — the property was shown to have a 'depression', 'water course' or 'open drainage' line through any part of the property based on modelling with a simplistic two-dimensional hydraulic model using the 2m contour information;
  - ***Criteria 3*** — any part of the property was located within 10 metres of a piped or open drainage line identified on the 'pit and pipe layer' from Criteria 1;
  - ***Criteria 4*** — any part of the property was located within 10 metres of a 'depression', 'water course' or 'open drainage line' identified from Criteria 2.



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Staged approach?

- STAGE 2 – Detailed Site Inspections and Mapping
  - All properties identified in Stage 1 where groundtruthed

- STAGE 3 – Peer Review and Expert Panel Workshop
  - A peer review of the methodology used in Stages 1 & 2 was undertaken
  - Involved representatives from Council, OEH, Cardno and 6 other Councils with similar overland flow issues
  - Main recommendation of this stage was there needed to be further refinement of the mapping prior to the release of the study

The study was put on hold after Stage 3 until grant funding was obtained

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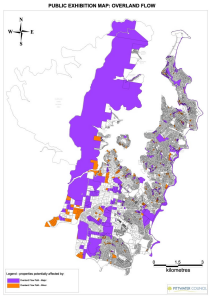
Staged approach?

- STAGE 4 – Detailed Mapping and Additional Groundtruthing
  - Incorporated the key recommendations of Stage 3:
    - use of LiDAR data which was previously not available in Stage 1 and 2;
    - modelling of a range of design storms, up to the PMF, and
    - sensitivity testing of climate change impacts

The aim of stage 4 was to identify where the overland flow risk was



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Outcomes of the Staged approach

- STAGE 1 – identified 4101 properties
- STAGE 2 – identified 3807 properties
- STAGE 3 – identified further refinement of the criteria and model required
- STAGE 4 – identified 1833 properties
  - Stage 4 went on public exhibition in November 2012

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Lessons Learnt

- Defining what 'Overland Flow' is
- Mapping – vertical freeboard v's horizontal freeboard
- Blocked v's Unblocked
- Property Based Maps v's extent based maps
- Community Consultation

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Defining what is Overland Flow

- Previous Definition – Major
  - is any land that has a depth of overland flow greater than 0.3m, or any land that is affected by high hazard with a depth of overland flow greater than 0.15m. The inclusion of high hazard is reflective of the risk to personal safety and significant damage to property, as identified in the NSW Governments Floodplain Development Manual (NSW Government, 2005).
- New Definition - Major
  - is land that has a peak flood depth of overland flow greater than 0.3m

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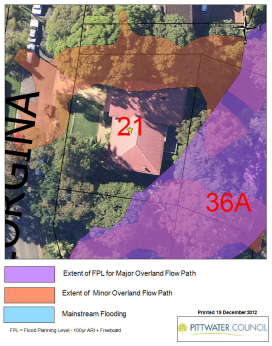
Defining what is Overland Flow

- Previous Definition – Minor
  - is any land that has a depth of overland flow greater than 0.15m and less than 0.3m and is not within a high hazard area. A 0.15m filter was selected as this is generally the standard height of most kerb and gutters within the Pittwater LGA. Depths in excess of this are likely to represent a reasonable proportion of flow, particularly within the steep terrain of the Pittwater LGA.
- New Definition - Minor
  - is land that has a depth of overland flow greater than 0.15m and less than 0.3m

DRAFT Overland Flow Map



DRAFT Overland Flow Map

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Vertical freeboard v's Horizontal freeboard

- A 0.5m flood extent freeboard was added to Major Overland Flow Paths
- This freeboard tagged 112 properties
- A pilot study was conducted to test whether a 5m horizontal freeboard was more appropriate

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Vertical freeboard v's Horizontal freeboard

- Results of Pilot Study:
- A 37% reduction in area identified as Overland Flow Path – Major;
- 26 properties removed from the Overland Flow Path – Major classification;
  - 9 of the 26 properties reclassified as Overland Flow Path – Minor;
  - 17 of the properties no longer classified as flood affected

Vertical 0.5m freeboard Extent
DRAFT Overland Flow Map
Previous FPL extents

Extent of FPL Major Overland Flow Path
Extent of Minor Overland Flow Path

FPL = Flood Planning Level - 100yr ARI + Freeboard

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5m Horizontal Buffer Extent
DRAFT Overland Flow Map
Revised FPL extents

Extent of FPL Major Overland Flow Path
Extent of Minor Overland Flow Path

FPL = Flood Planning Level - 100yr ARI + Freeboard

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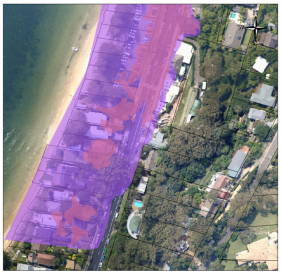
Vertical 0.5m freeboard Extent
DRAFT Overland Flow Map
Previous FPL extents



Extent of FPL Major Overland Flow Path
Extent of Minor Overland Flow Path

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5m Horizontal Buffer Extent
DRAFT Overland Flow Map
Revised FPL extents

Extent of FPL Major Overland Flow Path
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FPL = Flood Planning Level - 100yr ARI + Freeboard

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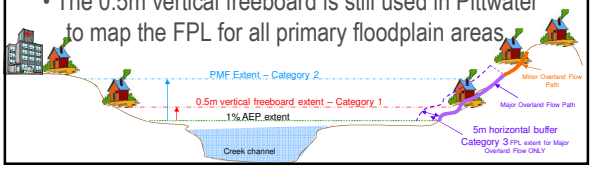
Vertical freeboard v's Horizontal freeboard

- Outcomes of Pilot Study:
- the 5m horizontal freeboard provides a consistent approach
- disadvantage: when side slopes are greater than 10%
  - Results in these areas having on average a freeboard 2.5m wider than with the 0.5m vertical freeboard extent
- The 0.5m vertical freeboard is still used in Pittwater to map the FPL for all primary floodplain areas



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Blocked v's Unblocked Pipes

- Pilot models were developed with and without blockage
- Results:
  - an average difference in flood levels of 0.05m to unblocked pits and pipes and a maximum difference of 0.12m for the 1% AEP flood event.
  - The 1% AEP flood event overland flow flood behaviour with unblocked pipes was similar to the overland flow behaviour for the 5% AEP event with all pipes assumed to be fully blocked.
  - There was an average difference of 0.01m and a maximum difference of 0.08m between the 5% AEP blocked scenario and the 1% AEP unblocked scenario.

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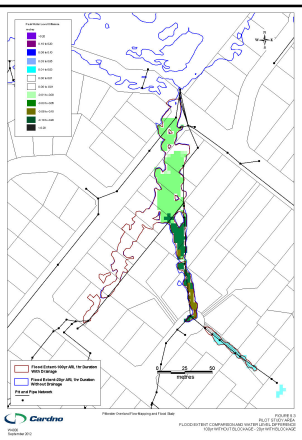

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Blocked v's Unblocked Pipes

- The 5% AEP with blockage scenario was considered a suitable representation of the 1% AEP without blockage scenario.
- The overland flow models for the Pittwater LGA were run with the above scenario.
- The notion of blocked and unblocked pipes seemed to be poorly understood by the community - from property owners and in some cases the 'experts' that they engaged.

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Property Based v's Extent Based Maps

- Property based maps are used in the Pittwater 21 DCP – and indicated yes/no if a property is impacted.
- Issues:
  - 'scaring' property owners who thought the overland flow path occurred across their entire property;
  - not knowing the difference between a property based map and an extent map;
  - confusion on how flooding is likely to occur; and
  - misconception about the purpose of section 149 planning certificates.

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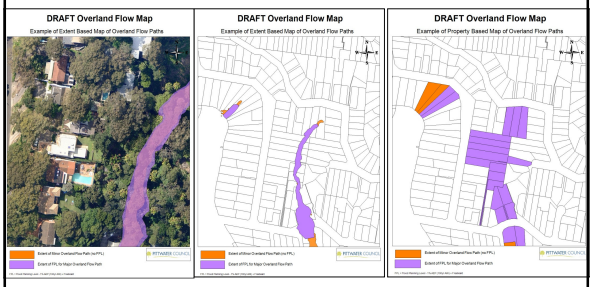

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Community Consultation

- Each of the property owners received written correspondence
- a lot of interest and questions from concerned property owners, with a 6% response rate.
- Due to the property specific nature of overland flow paths a large community forum/meeting would not be of benefit. Therefore one-on-one sessions were held during the public exhibition period.

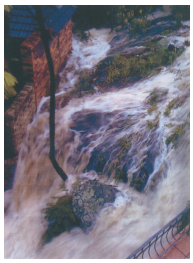

Photo Taken by L. Morgan

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Community Consultation

- Information Sessions:
  - Face-to-Face (220 property owners attended)
  - Phone Sessions (50 property owners engaged)
- These sessions worked well as most people were interested in their own property or their neighbours.
- During the public exhibition period Council staff received approximately 130 calls from property owners with further questions.
- The public exhibition period was originally 8 weeks but extended by two more weeks due to public feedback.

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Community Consultation

- The key matters raised:
  - Concerns about the validity of the study results.
  - Concerns about changes to their planning certificate notations.
  - Questions why Council undertook floodplain management at all.
  - Concerns about impacts on insurances, mortgages, property values.
  - Wanting to know how Council is going to fix the problem/stop the flooding.
  - Concerns that Council will pass the risk to the property owner.
  - Identifying that Council should then increase its drainage system to cope with the 1% AEP flood event.
  - Concerns about lack of historical evidence of the 1% AEP flood event and therefore the validity of the results.

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Summary

- Of the 1,883 properties notified - 120 submissions received
- The majority of the submissions relate to the S149 (2) and the perceived 'knock on' affects of increased insurance premiums and decreased property prices
- Councils need to have a clear communicable plan on what they intend to do with the information, and ensure the methodology undertaken is fit for purpose.

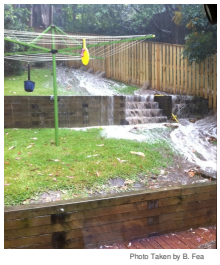

Photo Taken by B. Fea

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Take Home Messages

- Definition - choose a definition that can be well understood and easily set out in development controls.
- Choose the correct freeboard - Councils need to thoroughly consider how the freeboard is selected, depending on the nature of the study and study area characteristics.
- Develop a clear community engagement strategy and ensure appropriate resourcing using targeted techniques in engagement (one on one/ phone sessions)
- Require more guidance from State Government on how to define and map Overland Flow Paths in urban areas – for a consistent approach

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Questions?