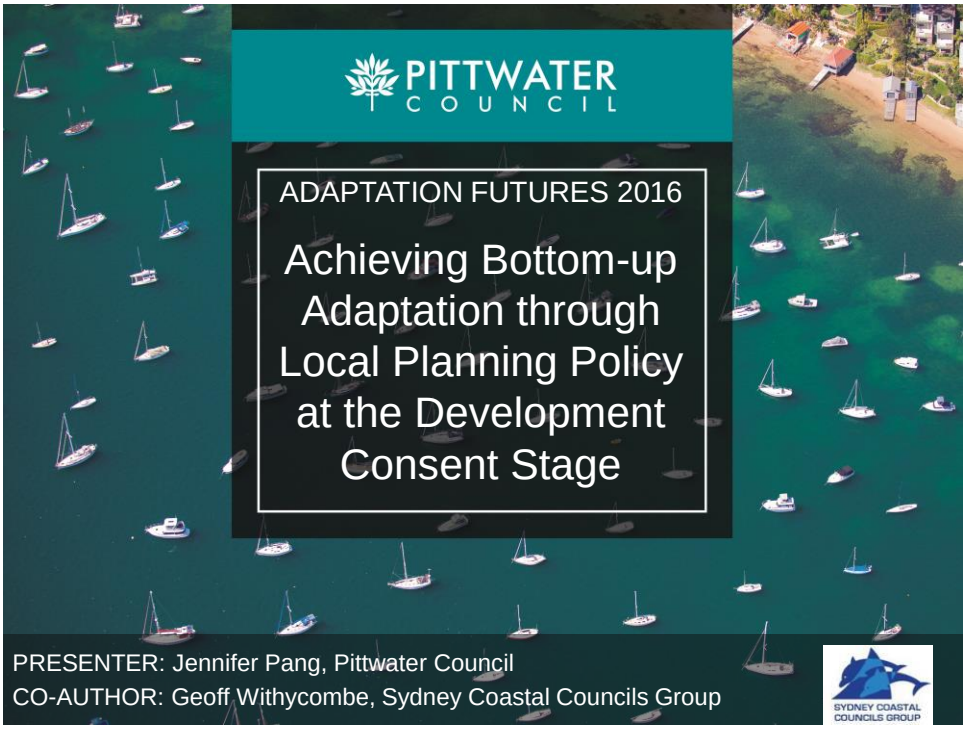

Outline

- Environmental planning in Australia
- Climate pressures on local development planning
- Policy and plans as response measures
- Development for climate resilience
- Strengthening planning policy approaches & pathways forward

Environmental Planning in Australia

1 Federal Government + 6 State & 2 Territory Governments + 565 Local Governments

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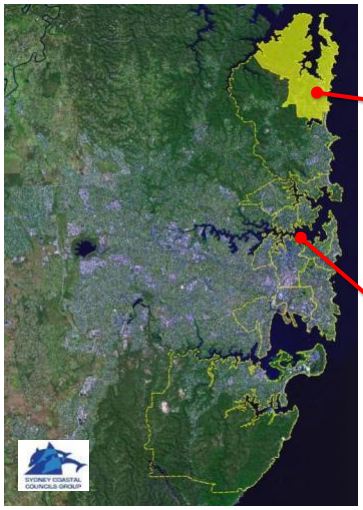
Pittwater Local Government Area



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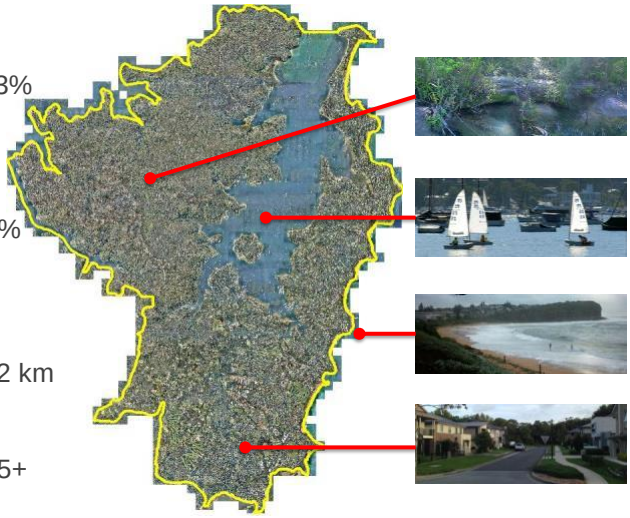
Pittwater Local Government Area

- Area: 125 km^2
  - National Park: 43%
  - residential: 41%
  - commercial: 9%
  - light industrial: 1%
- Population: 64,200
- Coastline: 18 km
- Estuary perimeter: 52 km
- Beaches: 9
- Coastal floodplains: 5+



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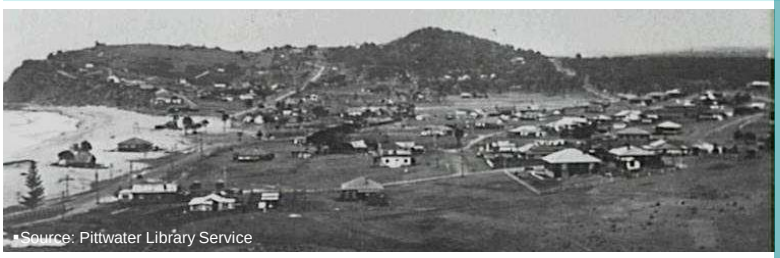
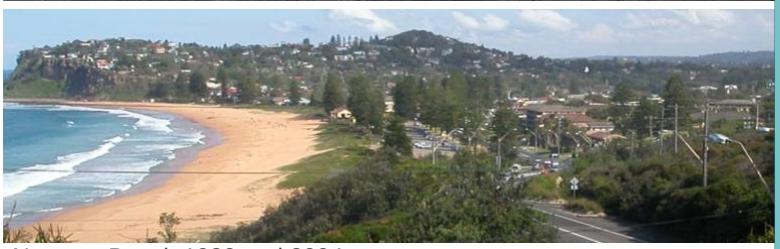
Urban Development in Pittwater



Source: Pittwater Library Service

- 23,417 private dwellings (2011)
- 73% separate houses
- Median house value 880,390€



Newport Beach 1930 and 2004

- 200 approved residential buildings 2014/15
- 70% residential
- Value of total approvals 146,661,160€

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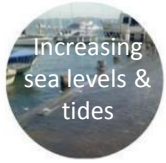
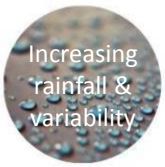
Climate Pressures

Present Day

- Maximum tidal range 1.86m
- 100 year ARI ocean 1.4m AHD
- Number of hot days a year >35°C: 3 days
- Annual average rainfall 1094mm
- East Coast Lows commonly during Autumn and Winter



Climate Change Impacts on Pittwater



2070 - 2100

- 0.9 metres sea level rise
- 100 year ARI ocean 2.3m AHD
- Number of hot days a year >35°C: 5.6 days
- Annual average rainfall + 10.4% increase
- Rainfall in Autumn -15% to +42%

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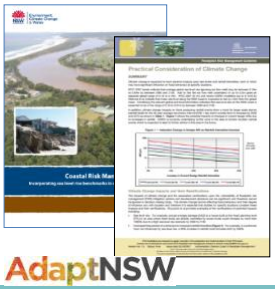
Top-down Climate Adaptation?

Federal Government

State Government



- National Climate Resilience and Adaptation Strategy 2015
- Sea level rise mapping tool
- Guidelines, data and research
- Gazetted manuals for natural hazards (flood/coast/fire)
- Practice guidelines
- Regional projections and data

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Key Legislation, Plans & Guidelines

			Climate Change?
State	LEGISLATION	**Environmental Planning & Assessment Act** ▪ establishes planning authorities ▪ defines procedures to obtain development approval ▪ makes Environmental Planning Instruments (EPIs)	☒
State	EPI	**State Environmental Planning Policies** ▪ relates to the whole or part of the State	☒
Local	EPI	**Local Environmental Plans (LEP)** ▪ relates to a Local Government Area - Pittwater LEP ▪ sets land use zones & permissible development	☑ (sometimes)
Local	GUIDE	**Development Control Plans (DCP)** ▪ relates to a Local Government Area - Pittwater DCP ▪ sets development criteria	☑ (sometimes)

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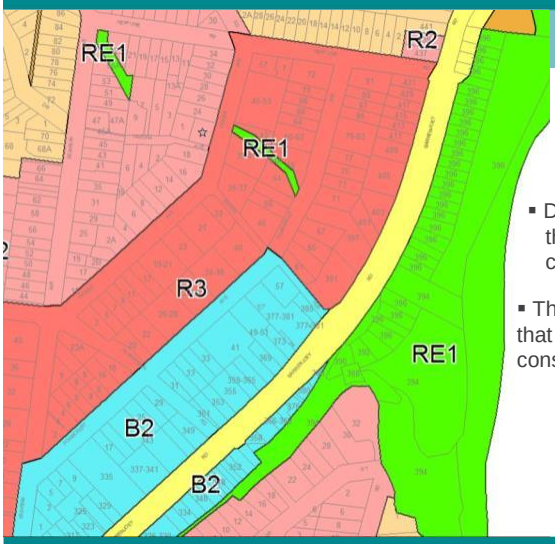
Pittwater Local Environmental Plan (LEP)



Climate Change References

- Occurs in the Aim:

  "... to minimise risks to the community in areas subject to environmental hazards including climate change..."

- Development needs to take into account the future impacts of climate change on coastal processes and flood hazards

- The planning authority needs to be satisfied that climate change has been appropriately considered:

  "Development consent must not be granted under this clause unless the consent authority is satisfied that:... sea level rise, coastal erosion and recession, or change of flooding patterns as a result of climate change, have been considered...."

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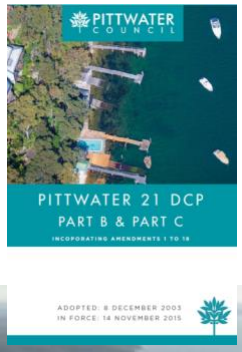
Pittwater Development Control Plan (DCP)

Hazard Controls

Based on hazard mapping and depending on proposed land use:

- Coastline Hazard
- Estuarine Hazard
- Flood Hazard
- Plus Climate Change



Control Outcomes

- To protect people
- To protect the natural environment
- To protect private and public infrastructure and assets

- Climate change to assess for sea level rise and increased rainfall
- A higher level of hazard assessment to incorporate climate change impacts when intensifying development

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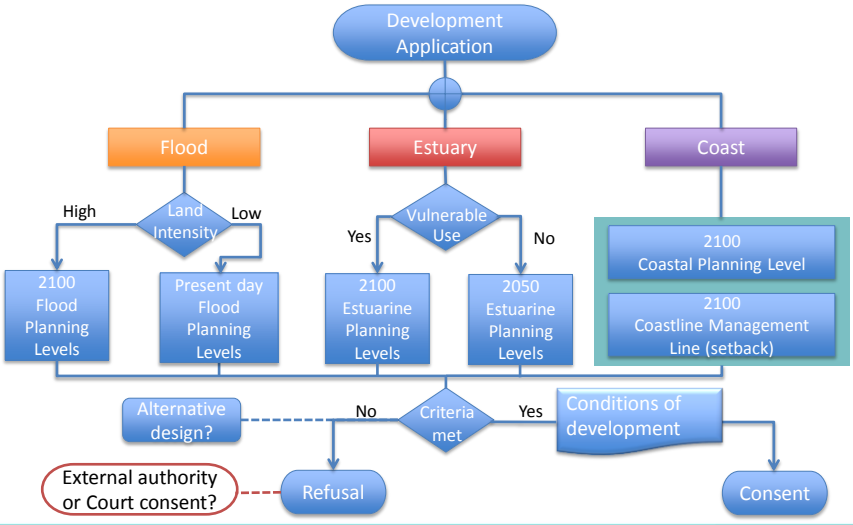
Development Consent



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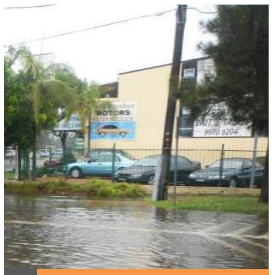
Policies to Practice



1 CATCHMENT FLOODING

2 ESTUARINE INUNDATION

3 COASTAL EROSION

- 175 survey respondents – 80% thought that an uncertain future climate should take into account Flood Planning Levels
- About 50% nominated restrictions on new development to manage flood risk
- Challenges to planning controls based on hazard rather than climate change
- Lot-based development favours building defences over retreat options
- Time limited approvals unreasonable?

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General Development Conditions

Minimum Flood/Estuarine/Coastal Planning Levels

- habitable and non-habitable floor levels
- all access points and potential water entry points
- carpark levels and entry crest of basement carparks
- new subdivisions in land release areas

Flood-proof below Planning Levels

- electrical equipment, power points, wiring, fuel lines or any other service pipes and connections
- use flood compatible materials for all structural elements below the planning level

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General Development Conditions

Allow for free passage of flood waters

- construction on piers
- no buildings or open carparking over floodways
- flood compatible fencing

Ensure safety of occupants

- storing hazardous materials above the planning level
- implementing a Flood Emergency Response Plan
- compliance with the Flood Risk Management Plan

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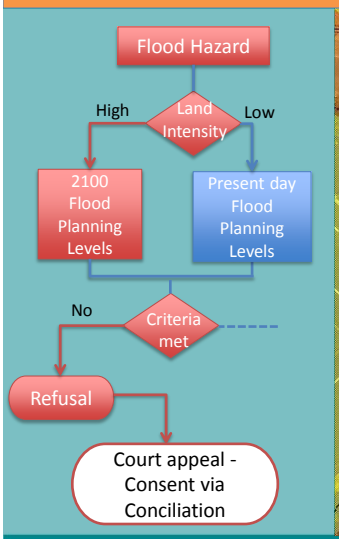
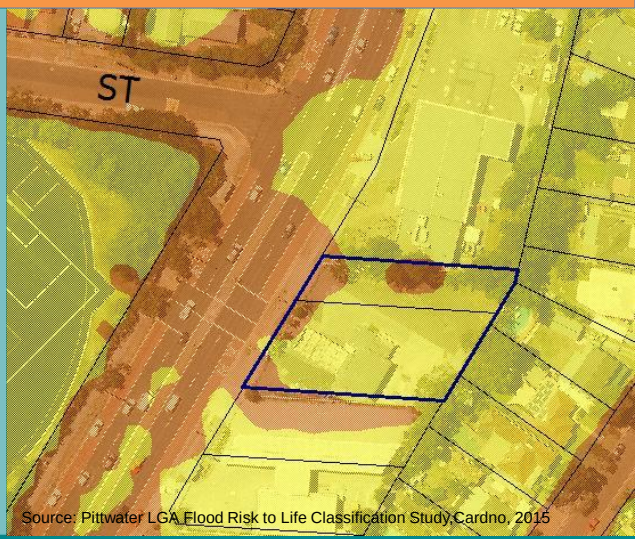
1 CATCHMENT FLOODING – CASE STUDY

New Business - Warehouse





Source: Pittwater LGA Flood Risk to Life Classification Study Cardno, 2015

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1 CATCHMENT FLOODING

New Business – Adaptive Solutions

Special development conditions (via negotiated outcomes):

- Adaptation above the present day Flood Planning Level by mitigation measures
- Flood doors/gates on entry and exit driveways
  - simple operation
  - have fail-safe backup power
  - must be maintained in good working order
- Flood-proof perimeter walls
- Structural certification to withstand flood forces

- Risk to life response by sheltering on-site in upper storey

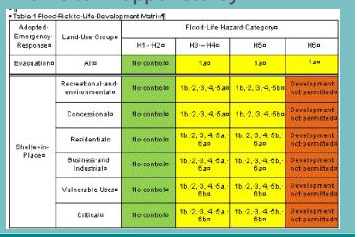

Table 1 Flood Risk to Life Development Matrix

Adopted Emergency Response	Land Use Groups	Flood Life Hazard Categories			
		H1 - H2	H3 - H4	H5	H6
Evacuation	All	No controls	1	1	1
Shelter-in-Place	Recreational and environmental	No controls	1, 2, 3, 4, 5	1, 2, 3, 4, 5	Development not permitted
	Concessionals	No controls	1, 2, 3, 4, 5	1, 2, 3, 4, 5	Development not permitted
	Residentials	No controls	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 6	Development not permitted
	Business and Industrials	No controls	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 6	Development not permitted
	Vulnerable Uses	No controls	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 6	Development not permitted
	Criticals	No controls	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 6	Development not permitted

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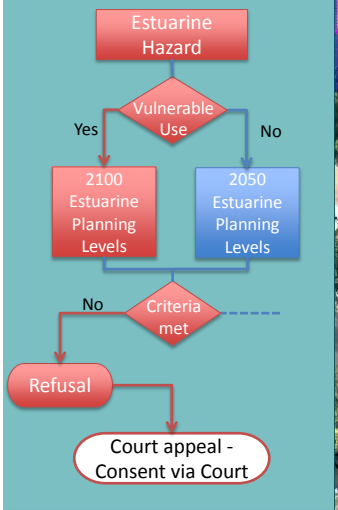
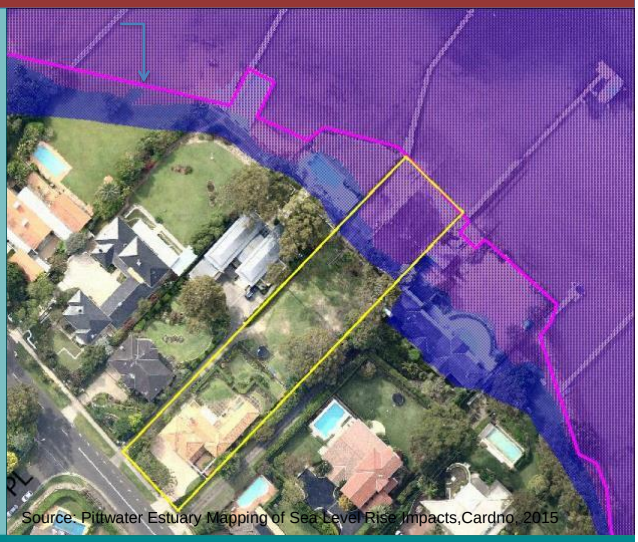
2 ESTUARINE INUNDATION

Strata Subdivision - Seniors Living





Source: Pittwater Estuary Mapping of Sea Level Rise Impacts,Cardno, 2015

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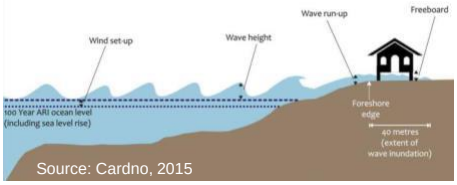
2 ESTUARINE INUNDATION

Strata Subdivision – Adaptive Solutions

Development controls (via Court decision):

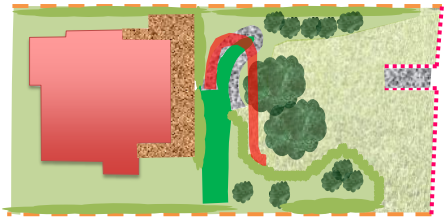
- Retained 2100 Estuarine Planning Level
  - Minimum habitable floor level
  - Entry crest into basement
  - Electrical services



Source: Cardno, 2015

Additional adaptation solutions:

- Re-orientation of access way to divert tidal inundation
- Resilient landscaping works and vegetation selection



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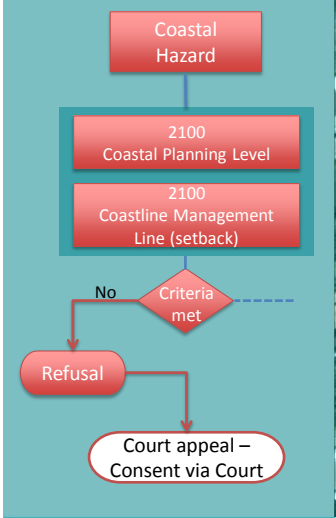
3 COASTAL EROSION

New Dwelling and Landscaping



Source: Draft Coastal Zone Management Plan, Haskoning Australia, 2015

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3 COASTAL EROSION

New Dwelling – Adaptive Solutions

Development controls (via Court decision):

- Reduced the 2100 setback using piled foundations
- Reduced the 2100 Coastline Planning Level and offset by:
  - Building design standards to cater for some wave action
  - Landscaping design to accommodate wave overtopping

Source: Lex Neilson

Source: Haskoning Australia

- Waterproof basement
- Flood compatible fencing
- Requirement for landowner to remediate any beach erosion on their property

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Bottom-up Climate Adaptation

Now	Forward Path
▪ Local planning policy driving climate adaptation in development	▪ Reduce challenges to local policy
▪ Extension of hazard mitigation	▪ Climate resilience at a strategic level rather than at property-scale
▪ Innovation in development consents	▪ More top-down direction and regulation

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