

Department  
for Environment  
and Heritage

# Climate Change and Coastal Management in South Australia

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# Coastal Management and Climate Change in South Australia

## Overview of presentation:

- Climate change – Global perspective
- Climate change – South Australian perspective
- Implications for coastal management in South Australia and the Coast Protection Board's role

# Global SLR Summary

- Increasing evidence that the Sea Level Rise (SLR) projections in the IPCC assessments are underestimates.
- Greatest uncertainty comes from Greenland and West Antarctic ice sheet contributions.
- Emissions and SLR observations are tracking at, or above, the worst case IPCC scenario.



# The South Australian Perspective

CSIRO (2006) regional projections for southern SA (for 2030 compared to 1990) include:

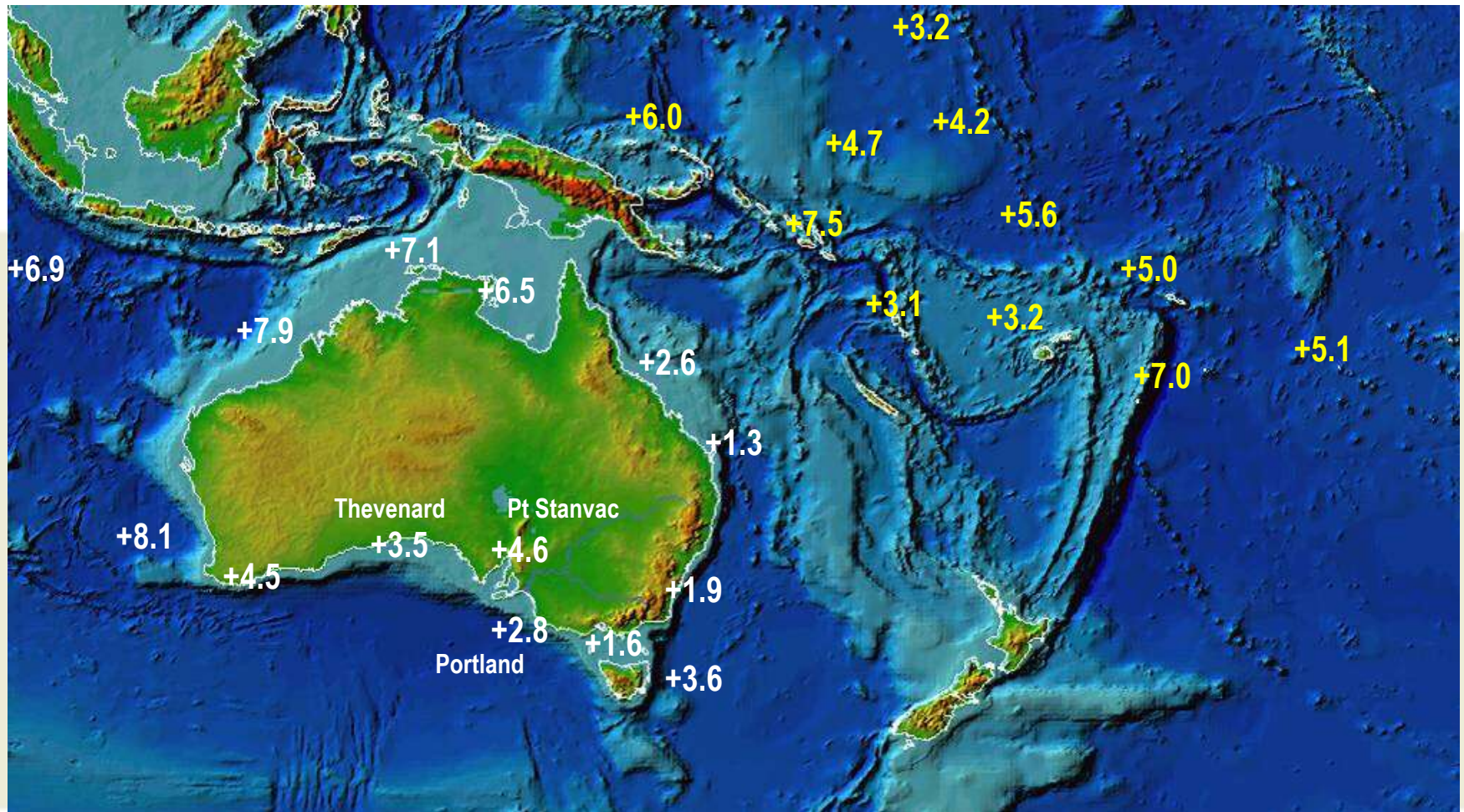
- warmer (+0.9°C)
- drier (rainfall -7.5%)
- increases in extreme weather events.

# The South Australian Perspective

## Sea level rise:

- Estimates from tidal records indicate global rate of SLR in the 20<sup>th</sup> century was 1.7mm per year.  
(South Australia 1.5mm/yr)
- National Tidal Centre's SEAFRAME project has been using a network of satellite calibrated tidal stations to accurately measure SLR since early 1990s.

# Net relative sea level trend at SEAFRAME sites in Australia and the south Pacific (mm/yr) since records began in early 90s

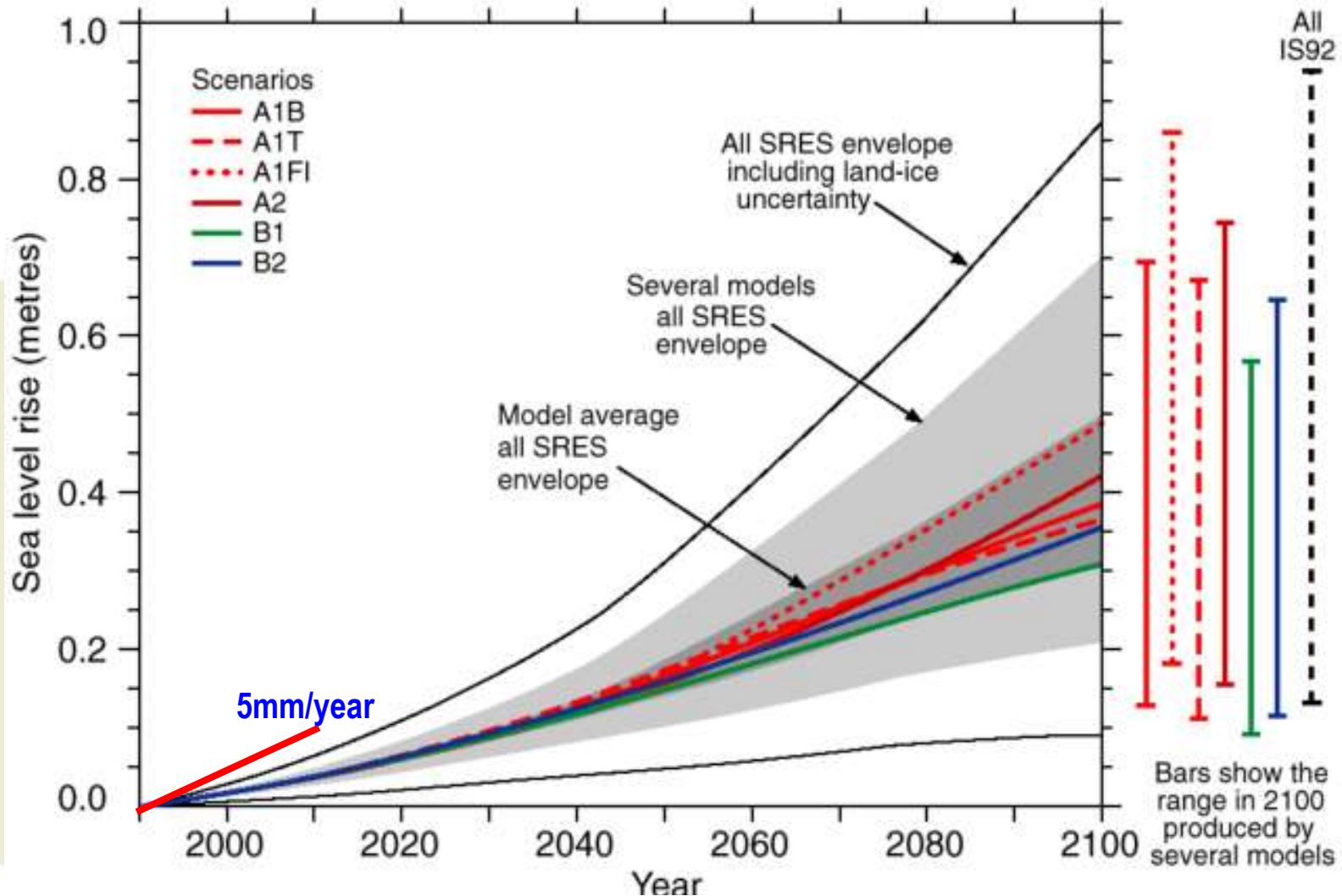


Slide courtesy of Bill Mitchell,  
Manager National Tidal Centre, Bureau



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**(e) Sea level rise** (IPCC Third Assessment Report "Climate Change 2001: The Scientific Basis")



**Slide courtesy of Bill Mitchell,  
Manager National Tidal Centre, Bureau**



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# Implications for Coastal Management

South Australia's coastline is diverse, so the impacts of climate change will vary.

# Canunda National Park & Lake Bonney



# Cape Borda



# Hallett Cove



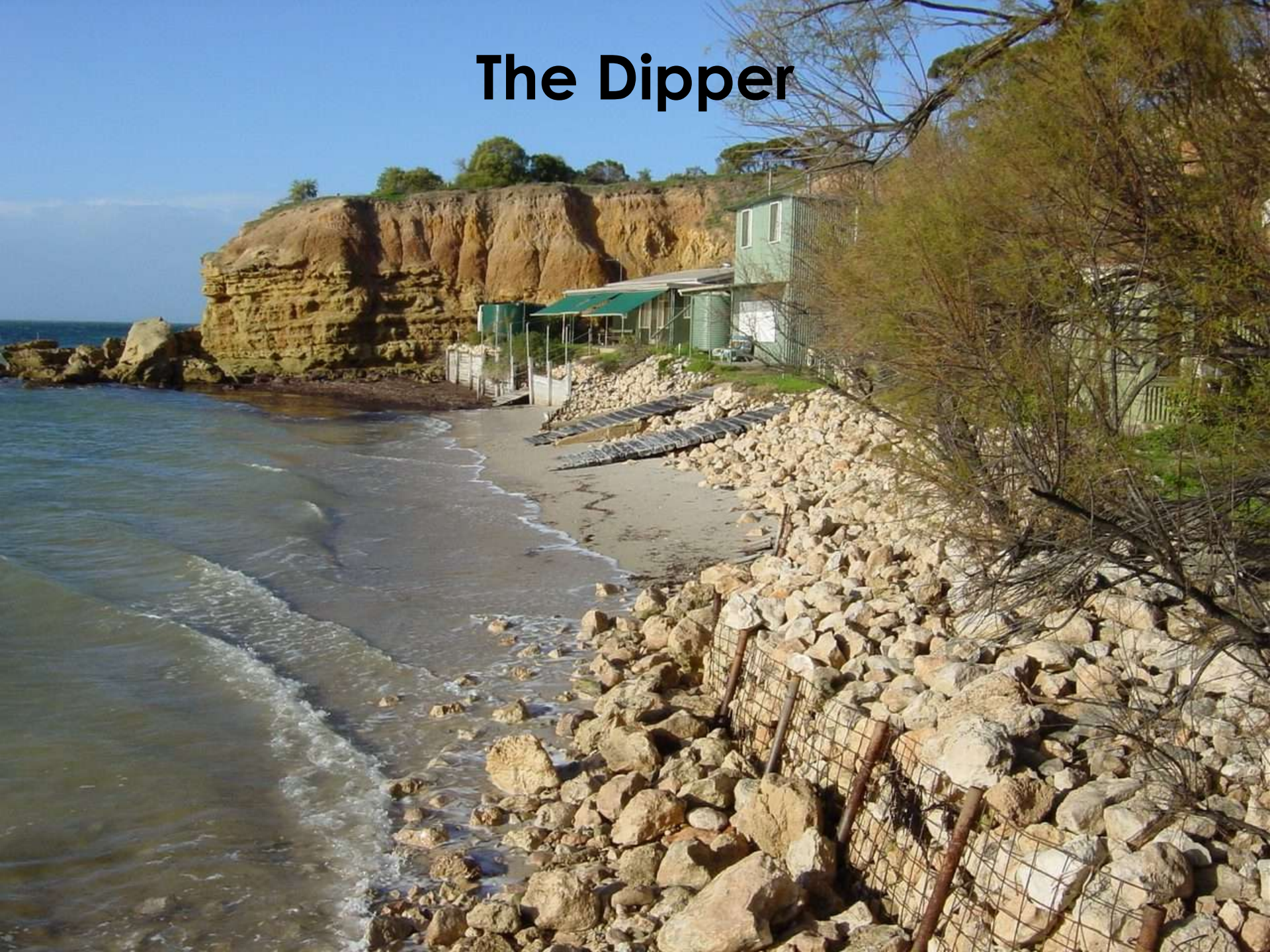
# Holdfast Shores



# Port Wakefield



# The Dipper



# Franklin Harbor & Cowell



# Mt Camel Beach



# Head of Great Australian Bight



# Implications for Coastal Management

Higher sea levels can mean:

- Increased severity and frequency of sea flood events.
- Increased coastal erosion.
- More difficult to maintain sandy beaches

# Coastal Flooding



**The Pines,  
Yorke  
Peninsula  
1981**



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# Coastal erosion



**Semaphore Park  
after 1981 storm**

SEMAPHORE PARK  
AFTER 1981 STORM

# Implications for Coastal Management

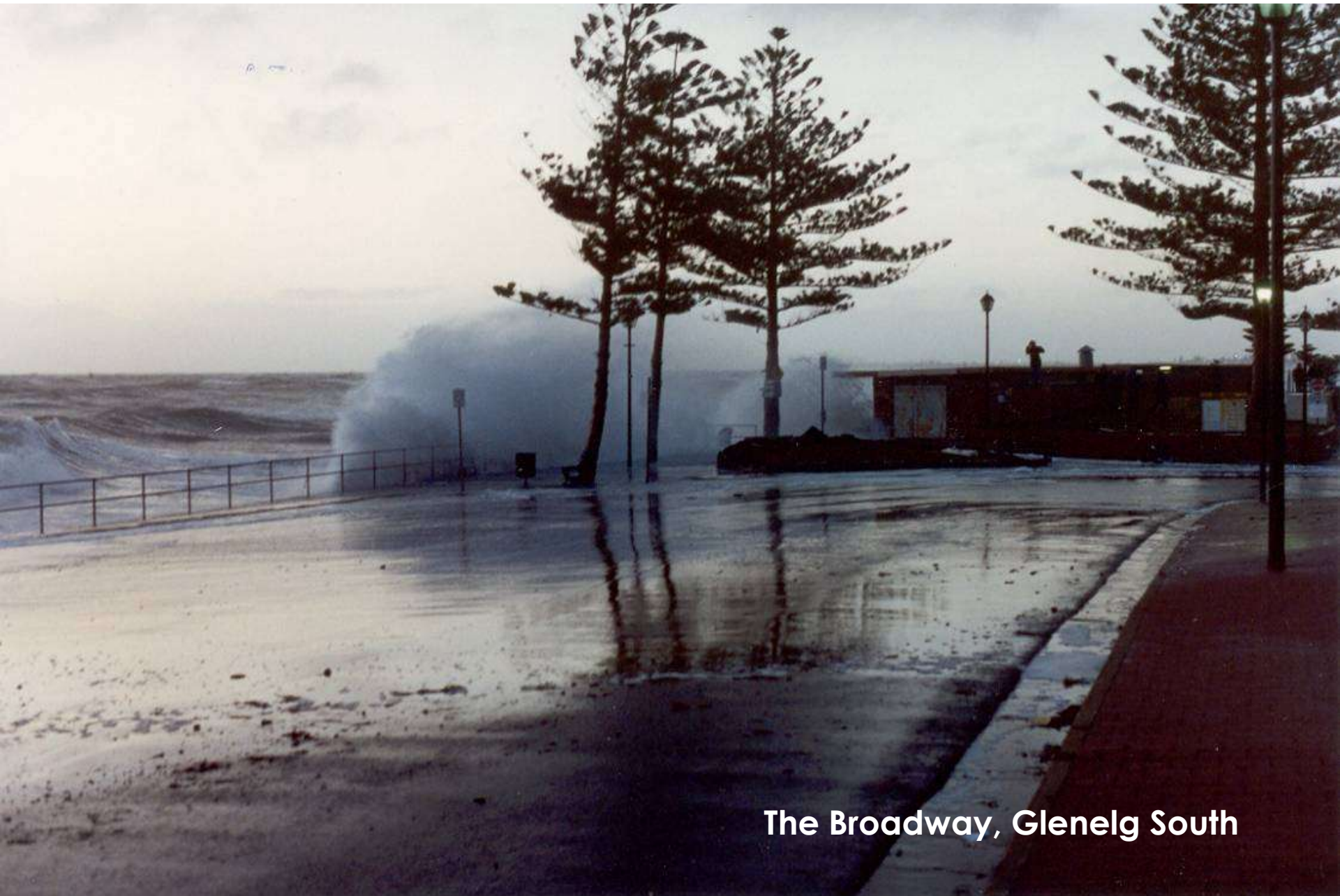
Higher sea levels can mean:

- Landward migration of intertidal ecosystems eg. mangroves
- Higher groundwater levels.
- Increased wave overtopping of protection structures.



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# Wave Overtopping



The Broadway, Glenelg South

# Implications for Coastal Management

Increased aridity means:

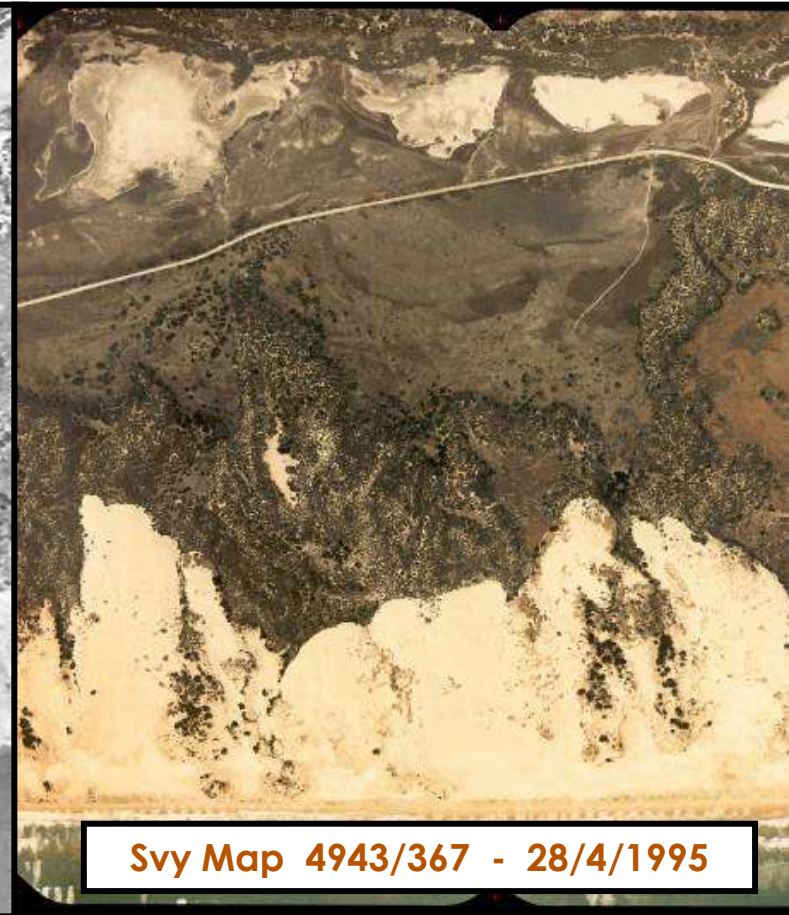
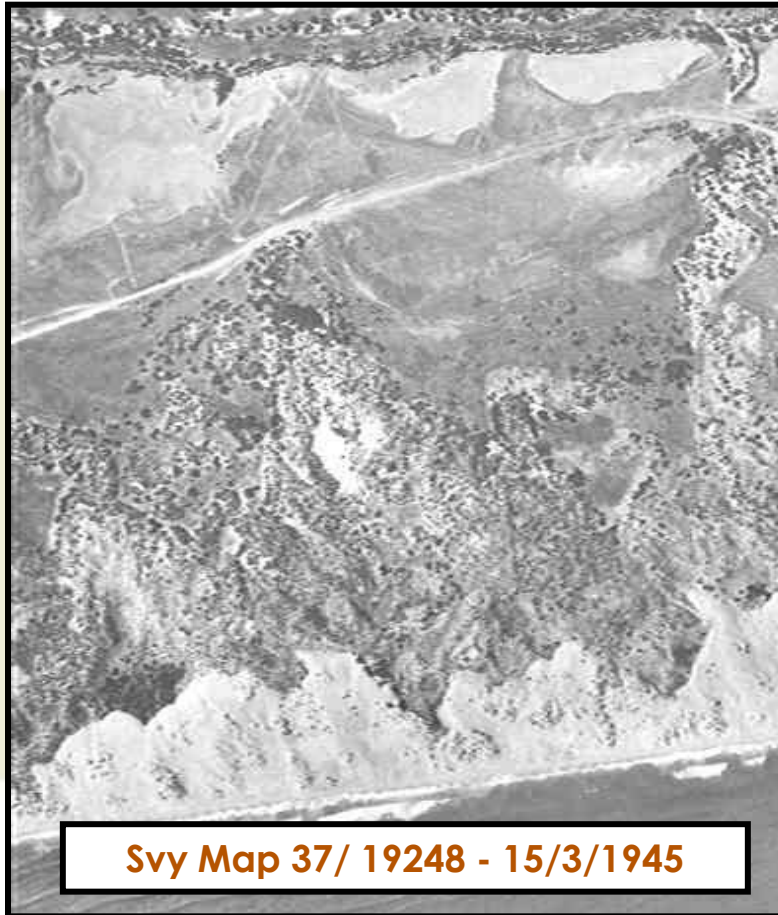
- Greater dune mobility.
- More difficult to establish revegetation component of coastal stabilisation projects.



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# Increased sand drift

Shoreline  
and dune  
instability  
near Tilley  
Swamp, SE



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# Increased sand drift



Lake  
George,  
South-east

# South Australian Coast Protection Board

The Board's response to climate change:

- Ensure new development is not at risk based on best available information (current policy review).
- Coordinate identification of areas at risk and preparation of response strategies
- Fund and build (with councils) protection works where necessary
- Monitor research outcomes (ongoing policy reviews) and provision of expert advice to Government, councils and the community



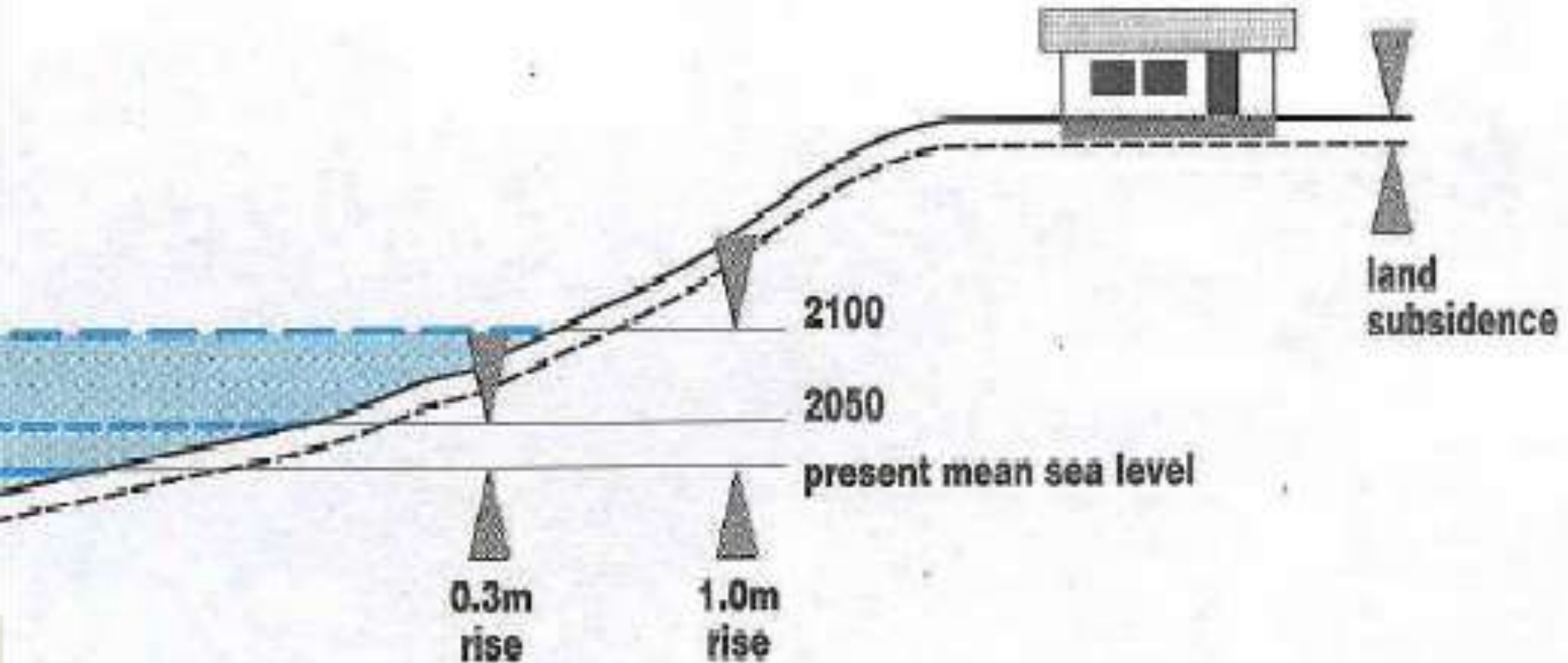
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# Development Control

- The Board's "*Policy on Coast Protection and New Coastal Development*" requires new development to be safe from SLR (currently under review).
- The Policy was endorsed by the SA Government in 1991.
- SA is the only state to have such a detailed policy position that defines allowances for SLR impacts.

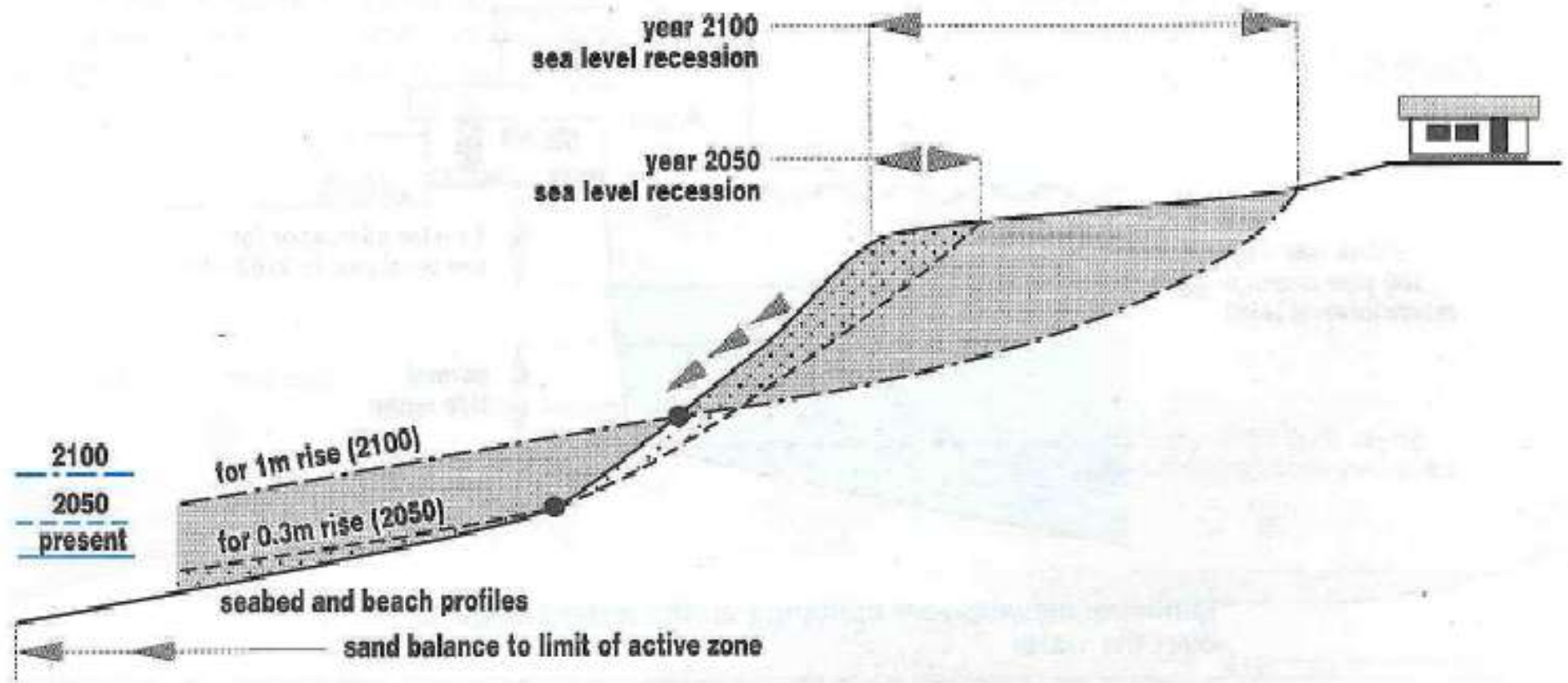
# The Board's current sea level rise policy

- Site/floor levels to allow for 0.3m SLR to 2050 and a further 0.7m in the following 50 years.
- Must allow for local and/or regional land subsidence.



# Erosion and sea level rise

- Board Policy also requires development to allow for coastal erosion/recession associated with SLR.



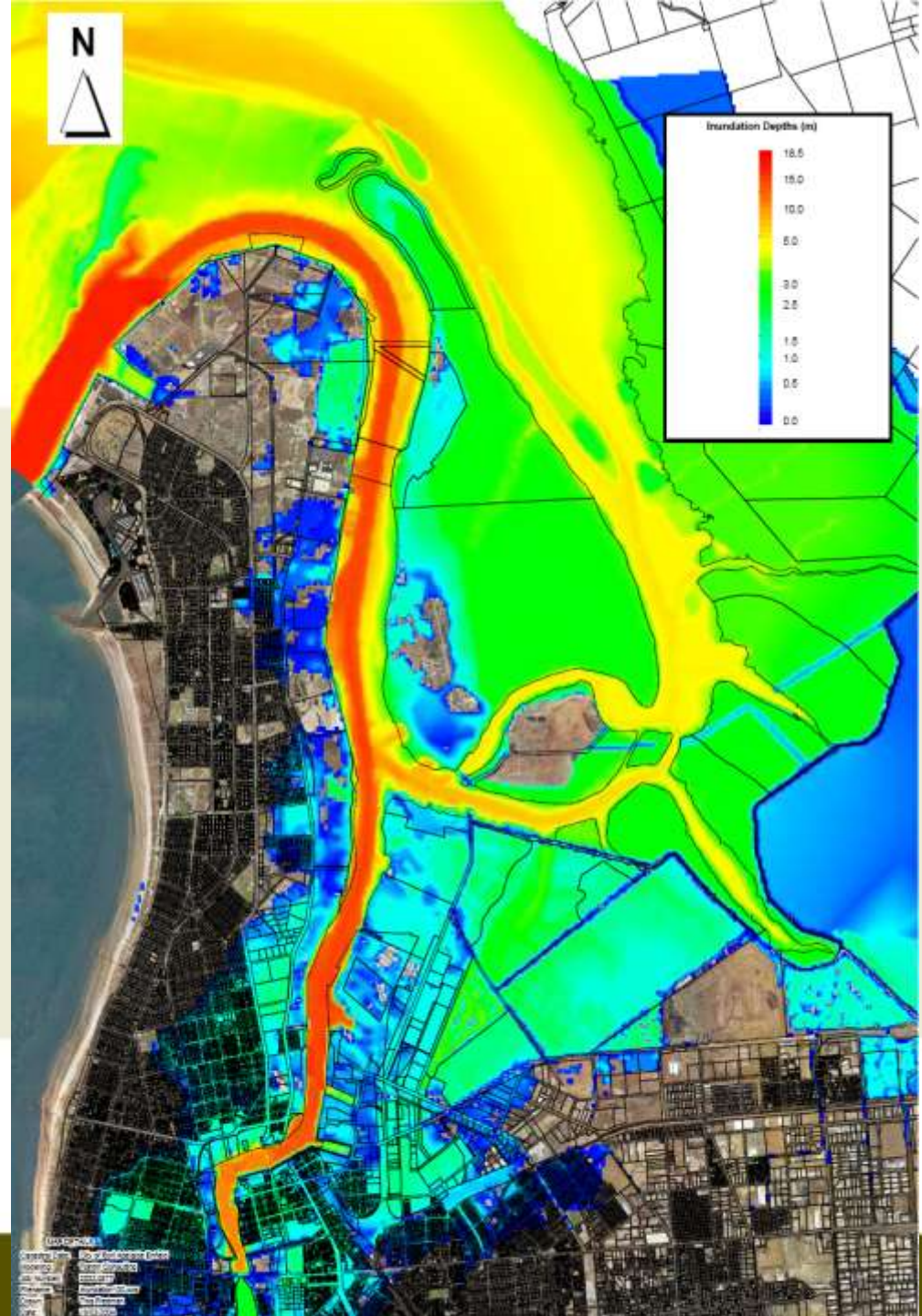
# Identify Areas at Risk and Prepare Response Strategies

- Requires high resolution Digital Elevation Models and bathymetry (National issue).
- Port Adelaide Seawater-Stormwater Flooding study.
- Yorke Peninsula pilot project (4 townships).
- National First Pass Vulnerability Assessment is building upon sea flood maps of Yorke Peninsula project to prepare response strategies.



# Port Adelaide Seawater – Stormwater flood mapping

100 year ARI storm,  
50cm SLR,  
21cm subsidence



# Monitor Ongoing Research

- Understanding of ice sheet dynamics is a major SLR research focus at the moment.
- Permafrost and methane?
- The next IPCC assessment will be released in 2013.
- The Board uses an advisory committee with relevant expertise to review its SLR policies.

# Three key challenges

- **Ensure that new development is not placed at risk from coastal hazards (including climate change impacts)**
- **Develop and act on strategies to protect existing at-risk development**
- **Allow coastal ecosystems to adapt to the impacts of climate change (retreat, migration)**



# Questions



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# The Global Perspective

- The Intergovernmental Panel on Climate Change (IPCC) compiles global research findings on climate change.
- First Assessment Report was released in 1990.
- Fourth Assessment Report (AR4) was released in 2007.

# Developments since AR4

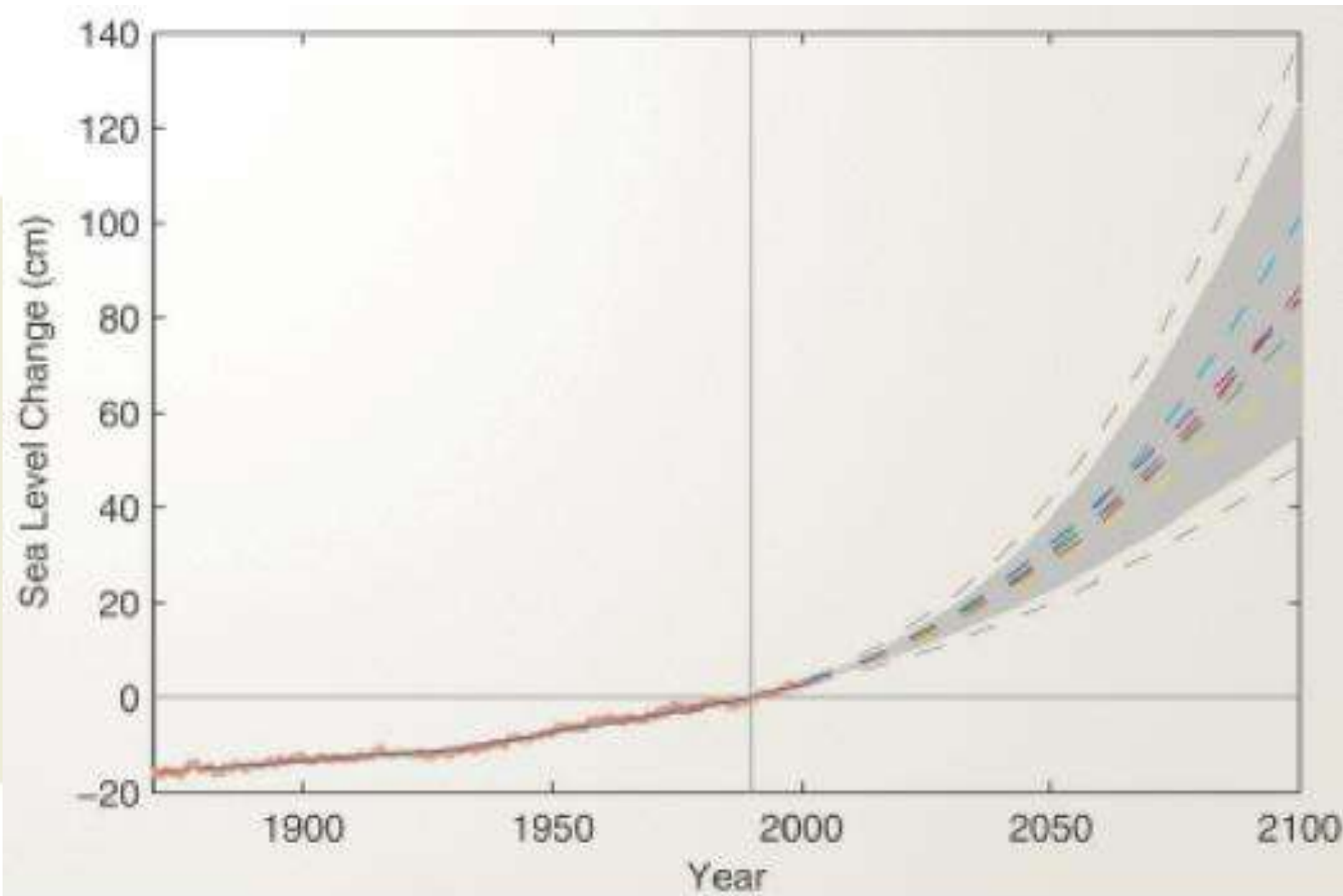
- Hansen (2007) has suggested that a rise of 5m to 2100 is not completely beyond question.
- However, Pfeffer *et al.* (2008) examine the physical basis of Greenland and West Antarctic ice melt and conclude that a maximum of 2.0m is possible, 1.0m probable.

# Developments since AR4 (Church et al (2008))

- There is increasing concern about the potential instability of both the Greenland and the West Antarctic Ice Sheets leading to a more rapid rate of sea-level rise than the current model projections. While our understanding of the relevant processes is limited, *it is important to recognize that the uncertainties are essentially one-sided: the processes can only lead to a higher rate of sea-level rise than current model projections.*



# Simple Statistical Projection based on Observed Relationship between sea levels and surface temp.



# Increased sand drift



**Brighton –  
turn of  
century**