0.91 Metres and Beyond: Lake Macquarie's Response to Sea Level Rise Preparedness and Planning

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Lake Macquarie City Council

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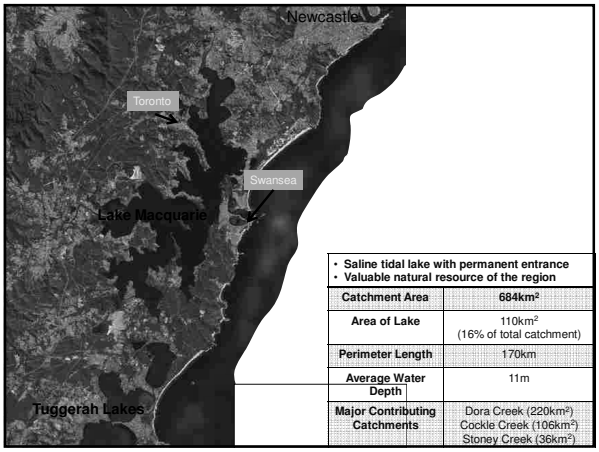
The "Ripping Yarn" of Lake Mac's 0.91 metre preparedness figure:

- plenty of interesting characters
- a plot that weaves and thickens



- **Saline tidal lake with permanent entrance**
- **Valuable natural resource of the region**

Catchment Area	**684km²**
Area of Lake	110km² (16% of total catchment)
Perimeter Length	170km
Average Water Depth	11m
Major Contributing Catchments	Dora Creek (220km²) Cockle Creek (106km²) Stoney Creek (36km²)

Chapter 1: The Rationale

- Scientific
- Risk
- Legal
- Media
- Political

Rationale: the science and policy

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Rationale: the science

Sea Level Rise Projections for 2100

IPCC Fourth Assessment Report (2007) Global average sea level rise (excluding ice sheet flow) - high emissions scenario – A1FI. Upper limit.	0.59 metres
IPCC Fourth Assessment Report (2007) Allowance for ice flow melt uncertainty	0.20 metres
CSIRO Technical Report (2007) Calculation for local NSW coast variation on IPCC global average sea level rise	0.12 metres
Accumulated level	**0.91 metres**

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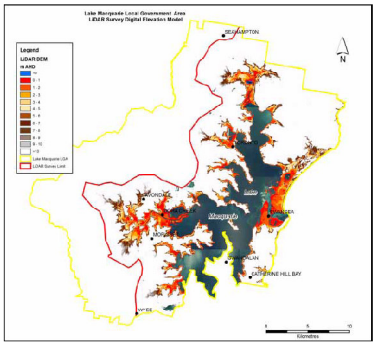
Rationale: the impacts

- Foreshore inundation and flooding
- Coastal and foreshore erosion, retreat, and storm damage
- Ecological impacts
- Damage to infrastructure
- Public health
- Economic

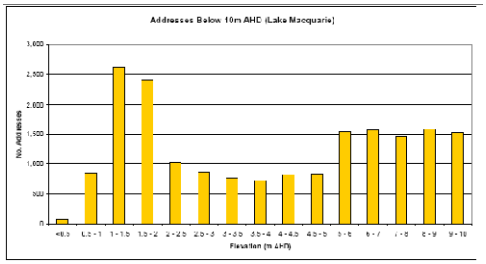
Rationale: the risks

Figure 37. Digital elevation model (DEM) of the Lake Macquarie City LGA highlighting areas below 10mAHD.

From Department of Planning *High resolution terrain mapping of the NSW Central and Hunter coasts for assessments of potential climate change impacts Final project report*



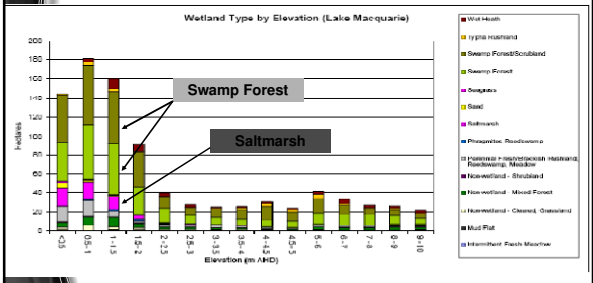
Rationale: development risks



Distribution of addresses in LiDAR survey area of Lake Macquarie City LGA. Chart classifies addresses by elevation below 10m AHD.

From Department of Planning *High resolution terrain mapping of the NSW Central and Hunter coasts for assessments of potential climate change impacts - Final project report*

Rationale: ecosystem risks



Wetland plant communities of Lake Macquarie City LGA (Council data). Swamp forest and saltmarsh dominate in area <1m AHD.

From Department of Planning *High resolution terrain mapping of the NSW Central and Hunter coasts for assessments of potential climate change impacts - Final project report*

Rationale: legalities

- 2008 Report by Sydney Coastal Councils Group:
  Coastal Councils and Planning for Climate Change
  - *... "Council will owe a duty of care to landowners in their consideration of individual development applications in … areas at risk from climate change"*
- Legal opinion from Council's solicitor:
  - Duty of Care
  - Precautionary Principle

Rationale: the media

Rationale: the media

Courtesy: Newcastle Herald

Rationale: the political will

- **Council briefing in 2007:**
  - **An Inconvenient Truth**
  - **The regional perspective**
  - **The local perspective**
  - ***'Informing the sceptics'***
- **Direction for action on climate change starting with sea level rise:**
  - **Duty of Care**
  - **Precautionary Principle**

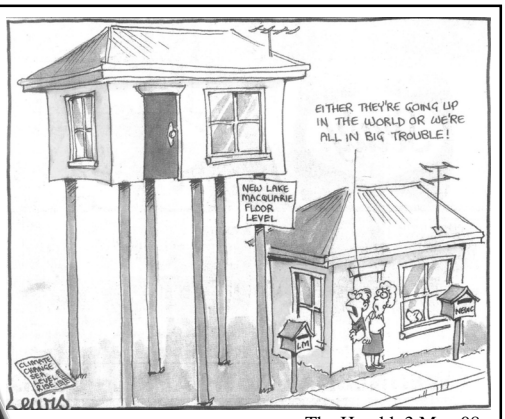
Chapter 2. Our Response

- Reports
- A stoush
- Policy
- Preparedness table

Response: 1st Council Report

"...publicly exhibit a proposal to adopt the … projected upper sea level rise figure for the year 2100 of 0.91m as the basis for Council staff to proceed with risk assessment, policy development, and planning and development decisions".

- **Public exhibition during May and June 2008 + Preparedness Table**
- **Follow up report to Council on 25 August 2008**



The Herald: 3 May 08

Response: submissions

Duty of Care	*- To restrict future development* *- Extends beyond floor heights (to infrastructure and ecosystems)*
Legal titles	*- "loss of land"*
Engineered works….	*- "not at the expense of the environment… as a last resort" v's* *- "… to construct a lock on channel"*
Requests for Council…	*- To advocate for compensation* *- To fund (or not fund) measures* *- To review emergency management*
Other	*- "…consider a 5metre SLR by 2100"* *- Need for continual review of figure* *- Ongoing $C0_2$/GHG reductions*

Response: beyond 0.91m, a policy impasse

Consider climate change impacts when determining development

- Amend our development assessment documents to incorporate climate change ASAP

V's

- Providing direction with respect to flood levels in accordance with the Floodplain Development Manual (2005)

- **Protection from liability under S. 733 of the Local Government Act 1993**

Response: good faith

Federal Court: Mid Density Developments Pty Limited v Rockdale Municipal Council [1993]:

"The statutory concept of "good faith" …. calls for more than honest ineptitude. There must be a real attempt by the authority to answer the request for information at least by recourse to the material available to the authority"

Council is making use of the best available information to assist in determining development applications.

Response: 2nd Council Report

Recommendation (Adopted 25 August 2008):

Council (in part) resolved:

C. Adopt the proposed Lake Macquarie Sea Level Rise Preparedness and Adaptation Policy

D. Progressively implement and review the Lake Macquarie Schedule of Sea Level Rise Preparedness Measures as the procedural mechanism for managing Council's adaptation response

E. Review the Lake Macquarie Flood Study (1998), Lake Macquarie Floodplain Management Study (2000), and Lake Macquarie Floodplain Management Plan (2001) to incorporate climate change/sea level rise related impacts, subject to funding.

LM Sea Level Rise Preparedness and Adaptation Policy

Our Commitment
Lake Macquarie City Council is committed to working with its residents to identify and respond to emerging hazards and risks associated with sea level rise (SLR)…

Our Goal
To provide a policy framework to assist Council and Lake Macquarie residents, as stewards of our city's environment, to respond responsibly and proactively to emerging SLR hazards and risks…

Policy available at: www.lakemac.com.au

Typical House at Swansea

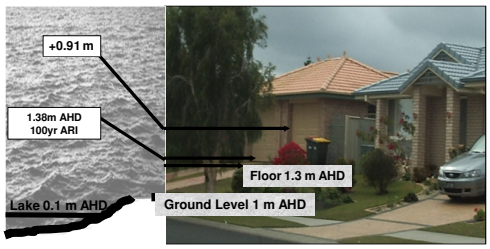


Photo courtesy of Richard Dewar; Consultant, WMA

Response: Schedule of Preparedness Measures

- **Preliminary "first pass" hazard / risk analysis**
- **37 actions across 5 primary areas:**
  - Sea level rise - still water conditions
  - SLR - flood conditions
  - Oceanic sea level rise
  - Effect of storm surge on SLR
  - Effect of extreme weather events on SLR
- **Responsible department + timeframe (1 – 4 years)**

Schedule of Activities Leading to Preparedness for Sea Level Rise (SLR)

Hazard Identification	Risk Identification / Source	Risk Analysis (R:L,C,T)	Risk Amelioration Actions Including Further Work/s Required	Dept/s: Resp = Bold	Est. T/Frame
1. Lake Sea Level Rise (under still water conditions)	Damage to properties / buildings (LiDAR estimates: 5500 addresses below 2m AHD, 6,500 addresses below 2.5m AHD).	Medium	**1.1:** Draft a Sea Level Rise Policy for Council approval. ***Purpose**: To provide clear and consistent direction to the community and to Council staff with respect to a preparedness level for SLR as the basis to proceed with risk assessment, community empowerment, policy development, planning and development decisions.*	**ES** + IP	8/2008
			1.2: Initial amendments to Development Control Plan No. 1, in particular Sections 2.1.7 Flood Management and 2.1.8 Development on Flood Prone Land at Dora Creek ***Purpose:** To ensure that predicted sea level rise is taken into account when determining appropriate floor levels of new buildings on affected land based on current information.*	**IP** + ES	12/2008 -
			1.3: Review all relevant provisions of Development Control Plan No. 1 (e.g. waterways and foreshores, building lines, building heights, stormwater, etc). ***Purpose:** To ensure that predicted sea level rise is taken into account when determining new development on affected land.*	**IP** + ES	12/2008 + Ongoing
			1.4: Undertake internal (Council) training and development programs to build capacity in assessment and compliance ***Purpose:** To ensure that all relevant LMCC staff involved in*	**IP** + ES	9/2008 + ongoing

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Administration: Section 149s and Flooding Certificates

- **Flood Levels for 50 year (2.27m) and 100 year (2.85m) development life**
- **Section 149 certificates:**
  - Properties below 3.0m AHD contour are noted on records
  - Advise under S. 7A of the 149 Cert as: "Flood Related Development Controls Information"
- **Council now issues a *"Development Restrictions Certificate Flooding / Tidal Inundation / Climate Change"***

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Administration: good planning principles

- **Changes create challenges to assessment**
- **Consider individual proposals on merit:**
  - risk to community and private assets
  - availability of services
  - context and situation of the locality
  - development life and construction type
- **Consistency: fairness, trust in process and trust in people.**
  - Integrated Management System (IMS)

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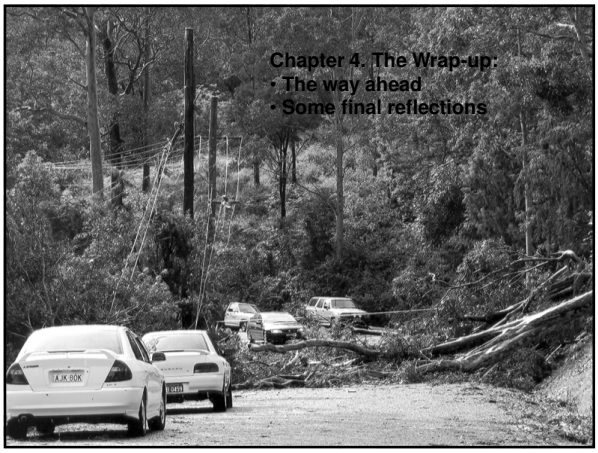

The Wrap-up: What's Next

- Review Flood Studies ASAP and update LEP and DCP with new Flood Planning Levels
- More comprehensive risk and vulnerability assessments
- Options analysis
- Citywide awareness programs + in-house capacity building
- Review long term development and landuse planning strategies
- Community empowerment programs to build participative democracy

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The Wrap-Up: Community Empowerment Programs

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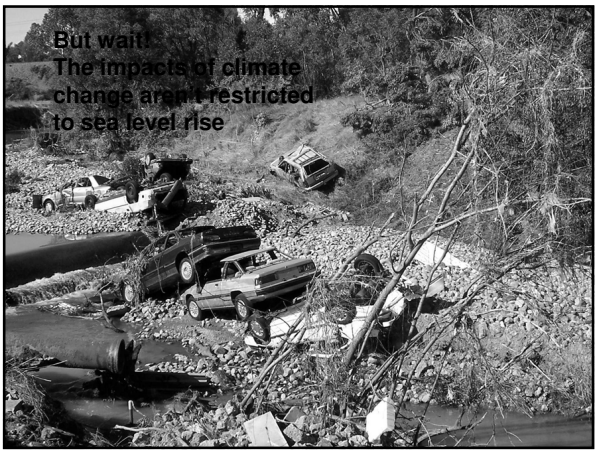

The Wrap-up: the final word

- A considered local approach
- The "process of doing" sets up networks to reduce risks in the shortest time
- Positive feedback from multiple stakeholders
- Programs need to encompass adaptation and mitigation
- 0.91 m is the start of the journey

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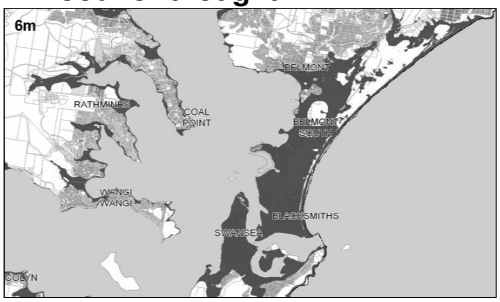
Food for thought…



Sea level rise may well exceed current predictions, and it doesn't stop at 2100. Six metres of sea level rise turns Lake Macquarie into Macquarie Bay, and Coal Point could be a wicked surf break.

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