The June 2007 Holiday Weekend Storm/Flood Event in the City of Lake Macquarie, State of New South Wales, Australia
Lessons Learnt in the Ensuring Years and Risk Reduction Management Actions Implemented

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City of Lake Macquarie  New South Wales  Australia
Distance from Sydney, State of New South Wales, Australia to Seattle, Washington State, USA approx. 7,750 miles.

Delta Airlines Flight DL6799
Sydney to Los Angeles
Delta Airlines Flight DL2060
Los Angeles to Seattle
Welcome to the City of Lake Macquarie

Web address: www.lakemac.com.au

Locality Map

Local Government Boundary

South Pacific Ocean
Pre-amble and Overview
Lake Macquarie City and Lake Macquarie Waterway

- City is 90 miles north of Australia’s largest city, Sydney
- Area of City 182 mi² and population 202,347 (March 2012)
- Lake Macquarie waterway is a saline tidal lake
- Largest coastal lake in eastern Australia
- Lake outlets to Pacific Ocean by narrow/shallow channel
- Total Catchment Area of Lake 425 mi²
- Area of Lake waterway 68 mi² (16% of total catchment)
- Lake is 13.7 long and 2 to 5 miles wide
- Perimeter length 106 miles around Lake shoreline
- Average water depth 28 feet (max 36 feet)

- Major Contributing Catchments:
  Dora Ck (137 mi²); Cockle Ck (68 mi²); Stony Ck (23 mi²);
  Winding Ck (15 mi²); L T Ck (5 mi²); Nth/Sth Cks (4 mi²);
Aerial view of Swansea & Channel looking north from Pacific Ocean.
Lake Tahoe, USA comparison with Lake Macquarie, Australia

Lake Tahoe
- 22 mi long
- 12 mi wide
- 1,644 ft deep
- Tenth deepest lake in the world

Lake Macquarie waterway
- 14 mi long
- 5 mi wide
- 36 ft deep
- Largest coastal lake in eastern Australia
Lake Macquarie Waterway

Flood-affected Areas
- Cockle Creek
- Warners Bay
- Marks Point–Belmont
- Swansea–Pelican–Blacksmiths
- Dora Creek
- Carey Bay–Arcadia Vale
- Toronto–Fassifern
History of Flooding in Lake Macquarie City

In Perspective:

- Approx 16,700 flood prone land parcels in the Lake Macquarie City Local Govt Area
- Council’s flood records date back to 1927

- Common national plane is *Mean Sea Level* = 0.00 ft Australian Height Datum (AHD)
- Average Lake waterway level 0.33 ft AHD
- Highest recorded Lake flood 18th June 1949 = 3.94 ft AHD
Overview of June 2007 Storm/Flood Event in Lake Macquarie City

- Intense East Coast low-pressure system formed Thurs 7th June 2007 producing cyclonic (hurricane force) winds + accompanying torrential rainfall next 2 days

- Flood Watch alert issued by Australian Bureau of Meteorology @ 5.26pm on Thursday 7th June 2007

- Maximum recorded wind gust = 84 mph during early hours of Saturday 9th June 2007 (average wind speeds 58 mph)

- 13.5 inches of rain recorded at storm epicentre Croudace Bay township in 24 hour period 12.00am Friday 06/08/07 to 12.00am Saturday 06/09/07

- 3.2 inches and highest intensity rainfall recorded at Croudace Bay between 5.00pm and 6.00pm on Friday 8th June 2007
FIGURE 8: SATELLITE IMAGE OF EASTERN AUSTRALIA AT 15:30 ON 8 JUNE 2007

Source: Bureau of Meteorology from the Geostationary Meteorological Satellite MTSAT-1R of the Japan Meteorological Agency
Storm direction at Croudace Bay epicentre during storm peak 5.00pm – 6.00pm on Friday 8th June 2007
Elapsed real time montage showing rainfall intensities for the June 2007 storm event commencing AM Friday 6/8/07 through to AM Sunday 6/10/07.
The NSW State Premier Mr Morris Iemma, at 9.30pm on Friday 8th June 2007, officially declared the flood/storm event a *Natural Disaster* ($ funds eligibility).

Photo: Lucia Wilcox  Courtesy: ABC Newcastle
2007 Flood – Lake Macquarie waterway

- Low lying areas at townships of Swansea, Pelican, Marks Point, Belmont South, Belmont inundated by Lake flood

- Lake waterway rose over 3 feet in height overnight on Friday 8th June and peaked at 6.00am Saturday 9th June

- Peak recorded Lake flood level was 3.3 feet above the normal lake level

- Many foreshore properties inundated but most dwelling habitable floors constructed above June 2007 flood level

- Extensive Lake foreshore and revetment damages due to wind/wave action and erosion e.g. foreshore cycleways

- Lake recession by late afternoon Saturday 9th June 2007
Convenience Store at lakeside township of Marks Point
Comparable flood events
9th June 2007 and 18th June 1949
Marks Point township
9th June 2007 and 18th June 1949 flood comparisons
June 2007 and Easter 1949 flood comparisons Lake foreshore properties at Marks Point township
Lake is 3.0 feet above its normal level
Lake foreshore flooding at Belmont township on eastern shore
Lake waterway flood at Belmont Trailer Park circa 10am Sat 9th June 2007
Urban flooding at Swansea and Cardiff townships
Flood detail map showing areas impacted
Urban areas located upstream from Lake waterway - 2007 event flooding

- Main urban areas affected were Cardiff, Glendale, West Wallsend, Warners Bay, Windale, Gateshead townships.

- Urban stormwater drain systems experienced major flash flooding due to high flow velocities and extreme rainfall intensities (estimated >1 in 100 year chance rain event).

- Culvert / Bridge blockages by numerable objects (cars, containers, etc.) exacerbated flooding.

- Bridges at Cardiff, Glendale, Wakefield towns damaged.

- Cardiff CBD worst affected area (AUD $2M estimated damage losses to businesses – source "The Star" local newspaper dated 25th October 2007).
Typical urban road scenes on Friday night 8th June 2007
More typical urban scenes on Friday night 8th June 2007
Car showrooms at Cardiff township on 8th June 2007
Car blocking bridge culvert
SUV blocking urban stormwater drain
Force of floodwaters at Winding Creek, Cardiff railway underpass

Photo: David Cobbin  Courtesy:  ABC Newcastle
Aftermath - car bodies in Winding Creek at Cardiff  9th June 2007
Cardiff post-flood Caryard scene - up close and personal
Aftermath - Shops in Cardiff CBD with distinct flood line <3ft deep

Photo: Courtesy: David Wainwright WBM
Teralba Worm Farm kitchen – 3.94ft depth of water at flood peak 9.00 pm on Friday 06/08/07

Photo: Courtesy Craig Manhood
West Wallsend “Swimming” Pool 06/08/07

Olympic Pool

Floodwater
Road closed at Jewells Crossing, Redhead township Sat 06/09/07

Photo: Charlene Ingram  Courtesy: ABC Newcastle
Infrastructure and Property Damage
Wind damage
Wind/Wave damage Lake Macquarie waterway foreshore
Historical Significance

• Unlike previous historic floods the June 2007 holiday weekend flooding affected entire City of Lake Macquarie

• Worst local storm event in 33 years (previous east coast low was in 1974)

• Damage bill Lake Macquarie City was AUD 1.48 billion (insured losses - 2007 $ figures)

• June 2007 storm event officially ranked the seventh most costly natural disaster in Australian history (in terms of insured losses)

• 90,000 insurance claims made during 2007 (Source ICA)
2007 Statistics for Lake Macquarie Region

- 3,552 calls for assistance recorded in Lake Macquarie SES precinct
- 200+ people Cardiff/Barnsley region evacuated to safe ground
- 60 residents Dora Creek evacuated to Morisset Country Club
- 40 reports of landslip affecting private/public property received
- 2,200 truck loads of green waste taken to 4 designated sites to shred
- 2,300+ tons of green waste taken to Awaba Waste Man. facility
- 3,300+ tons of household waste taken to Waste Management. facility
- Infrastructure / Clean up damage bill for City = Aus $19 Million
- Damaged infrastructure took three years to repair/replace
- Worst local storm event in 33 years
Media Clippings – Courtesy of Newcastle Herald local newspaper
Pasha Bulker 84,592 US ton Panamanian bulk carrier grounded by storm at Nobbys Beach Newcastle, just north of Lake Macquarie City, on 8th June 2007
Lessons Learnt and Risk Reduction Actions Implemented

- Build ‘Environmental Security’ in the Lake Macquarie City community by boosting awareness, preparedness and resilience to deal with similar future flood/storm events

- Combine technical knowledge, infrastructure investment and community engagement into integrated programs as the basis for strategic planning and preparedness

- Meet the challenges head on and change behaviours of the community, governments and authorities alike

- Initiate and implement strategies, actions and community education programs aimed at planning and preparedness for future storm/flood events
Learning: The community needs to know what it can do to be “better prepared” for flood related natural disaster risks

Action: Enhancement of Lake Macquarie City Council’s website regarding Environment / Floodplain Risk Management

Council’s website revised to focus on:

* Threats to the environment (flood risk management advice)
* Preparedness tips – floods and severe storms
* Emergency management
* Planning for Future Flood Risks
* Climate change implications (e.g. sea level rise; increased rainfall)


Floods

Council’s role in floodplain management

Council, through its Floodplain Management Committee, formulates comprehensive flood study, floodplain risk management study, floodplain risk management plans and implementation programs for significantly affected major creeks and catchments within Lake Macquarie City, in accordance with the NSW State Government's current Floodplain

To date, Council has completed floodplain risk management studies and plans for the following major catchments:

- Dora Creek waterway (Dora Creek) - 1998
- Cockle Creek (Barnsley/Edgeworth/Boolaroo) - 2004
- North Creek (Warners Bay) - 2010
- Stony Creek (Blackalls/Toronto) - 2011
- Lake Macquarie waterway (The Lake) - 2012

Major catchment flood studies have also been completed for:

- LT Creek (Fassifern) - 2010
- South Creek (Warners Bay) - 2011
- Lake Macquarie waterway (The Lake) - 2012
- Jewells Wetland incorporating Scrubby, Johnsons, Crockers and Freshwater Creeks at Mt. Hutton, Windale, Gateshead, Bennetts Green, Jewells, Redhead - 2013
- Winding Creek and Lower Cockle Creek (Hillsborough, Cardiff, Glendale, Argenton, Boolaroo) - 2013
Your role in floodplain management

Minimising flood damage is a community responsibility. Whether you are a resident or a business owner, you have a responsibility to do whatever you can to prepare your property and minimise your flood risk.

- Read our 'Frequently Asked Questions' regarding flooding in Lake Macquarie City
- Visit our Emergency Ready Lake Macquarie webpage
- Visit our Flooding webpage if you are planning development on a property that may have flood-related development conditions.

To find out exactly how a property is affected by flooding and what development conditions apply you can obtain a Flood Certificate or Flooding/Tidal inundation Certificate from Council.

To find out more information on flood preparation please visit the SES Floodsafe website.

In a life threatening emergency, please call 000.

If you need emergency assistance during a flood, please call the SES on 132 500.
Learning: *The community needs to know what it can do to be better prepared for flood related risks*

Action: *Collaboration between Council and Community to produce Local Area Adaptation Plans for Lake Macquarie Waterway Foreshore Management Areas*

Community and Council working together on local plans to consider the best options for managing flood and permanent inundation risks into the future

Things to consider include:

* The flood hazard
* Sea level rise
* Infrastructure
* The environment
* Development controls
Collaboration of Council and Community to produce Local Area Adaptation Plans

Planning for Future Flood Risks

Information on flooding in Lake Macquarie

A sign on the side of a road that reads "Collaboration of Council and Community to produce Local Area Adaptation Plans."

Planning for Future Flood Risks

Information on sea and lake level rise

Lake Macquarie City Council is committed to producing a local area community plan and is the lead agency for this information. The information has been gathered from Council and local stakeholders.

Planning for Future Flood Risks

Information on the legislative and policy framework for flood planning

Lake Macquarie City Council is committed to producing a local area community plan and is the lead agency for this information. The information has been gathered from Council and local stakeholders.

What causes sea level rise in Lake Macquarie?

Sea levels are rising due to the melting of the polar ice caps and glaciers. The rise in sea levels is expected to be between 0.5 to 1.0 meters by 2050.

How do floods affect residents?

Floods can cause significant damage to property, disrupt transportation, and pose a risk to human health. Floods can also lead to the loss of life.

Lake Macquarie City Council is committed to producing a local area community plan and is the lead agency for this information. The information has been gathered from Council and local stakeholders.
Learning: Teach the community how to prepare for flood risks

Action: Establish an **Emergency Ready Lake Macquarie** website

1. **Be Prepared**
2. **Stay Informed**
3. **Stay Safe**

**Be prepared**
Take simple steps to protect yourself, your family and property in a natural disaster or local emergency.

**Stay informed**
Sign up for severe weather alerts. In an emergency, tune in to local radio or the web, listen for advice, instructions and updates.

**Stay safe**
Know what to do and who to contact when an emergency happens in Lake Macquarie.

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**Flooding Warning Issued**
Are you prepared for a flood?

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**Severe Storm Warning Issued**
Are you prepared for a severe storm?
Action: Establish an **Emergency Ready Lake Macquarie** website:

**City of Lake Macquarie**

**Environment**

**Actual web page**

You are here > Emergency Ready Lake Macquarie

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**Emergency Ready Lake Macquarie**

If an emergency happened, would you know how to respond?

1. **Be prepared**
   
   Take simple steps to protect yourself, your family and property in a natural disaster or local emergency.

2. **Stay informed**
   
   Sign up for severe weather alerts. In an emergency, tune in to local radio or the web and listen for advice, instructions and updates.

3. **Stay safe**
   
   Know what to do and who to contact when an emergency happens in Lake Macquarie.

Council supports lead emergency services agencies to manage and respond to local natural disasters and emergencies.
Learning: The community needs to be engaged & connected to prepare for, respond to and recover from major flood events

Action: Launch the “Be Ready Be Safe” City-Wide Engagement Campaign, 2011-2015

- Sign up to the Early Warning Network (EWN) to receive emergency warnings and alerts to your email or mobile phone


- Prepare an Emergency Kit to ensure you have everything you require if you need to evacuate

- Develop an Emergency Plan to be better prepared if an emergency should arise

- Learn more about floods & storms in Lake Macquarie City
Learning: Encourage community education, capacity building, awareness & preparedness to deal with real flood events

Action: Align with Living Smart Festival and Australia Day Festival to spread the word / deliver advice on floods

Encourage Lake Macquarie City residents and businesses via media campaigns and festivals to become flood event ready

Community education initiatives launched by Lake Macquarie City Council include:

* Registering with the Early Warning Network
* Preparing an Emergency Plan
* Preparing an Emergency Kit
* Accessing Council’s website “Floods”
* Joining a Sustainable Neighbourhood group
* Conduct a local community drain audit
If you are advised to evacuate.

During heavy rainfall events, the NSW SES may issue an Evacuation Warning. This means that flash flooding is imminent in your area and you need to prepare for possible evacuation. The SES may not advise all residents and businesses of the warning, but there may be other reasons why people will be notified. Keep listening to the radio and follow any instructions given by the emergency services.

An Evacuation Order may be issued advising people of what to do and where to go. You must evacuate immediately. Seek shelter with family or friends who are away from areas impacted by flash flooding. In major floods, an evacuation centre may be established by Family and Community Services.

When you evacuate:
- Take your Emergency Kit with you.
- Turn off the electricity and gas at the mains before you leave.
- Turn off and secure any gas bottles.
- Take your pets with you.

Private Property KEEP OUT

Baker Street entrance to Emergency Flood Evacuation Route
Photos courtesy of Lake Macquarie City Council

Baker Street Emergency Flood Evacuation Route
An emergency Flood Evacuation Route is available for Baker Street residents. The entry to the road is located at the eastern end of Baker Street adjacent to the railway embankment. The route runs along the western side of the railway line and joins Motar Park Road. The road is located on private land and is not part of the public road system. During times of flooding, the road will be opened to allow residents access to Macquarie Street.

Evacuation Centre
An evacuation centre may be established by Family and Community Services. Information on and locations of these centres will be broadcast and included in the Evacuation Order. The evacuation centre may provide temporary shelter, food and clothing as well as information on further welfare assistance.

After a flood
Severe weather and flash flooding can result in major damage to property, potentially causing a range of health and safety issues.

When returning to your property:
- Ensure the structural stability of your property before entering. Check for damage to windows, walls and the roof and be especially cautious of potential contaminants including asbestos.
- Make sure the electricity and gas are turned off before going inside. Use a torch to carry out inspections inside buildings.
- If power points, electrical equipment, appliances or electrical hot water systems have been exposed to floodwater or are water damaged in any way, they must be inspected by a qualified electrician before use.
- Gas appliances and gas bottles that have been exposed to floodwater should be inspected for safety before use.
- Wear suitable protective clothing, including boots and gloves, when cleaning up.
- Never eat food that has been in contact with floodwater.
- Only use clean eating utensils, toothbrushes, towels or handkerchiefs.

For more information on personal and household safety after a flood, visit the Ministry for Police and Emergency Services (formerly Emergency Management NSW) website at www.emergency.nsw.gov.au/flood.

Disaster Recovery Centres may be established following some disasters. Recovery centres can provide a range of welfare services including financial assistance, personal support, temporary accommodation and providing information and relocations.

If you have been affected by floods and require assistance, contact Disaster Welfare Services on 1800 018 444.

Stay informed
The Cooranbong and Lake Macquarie City Emergency Centre (SES) Units can give you information on what you can do to reduce the effects of flooding on your family and your property.

Lake Macquarie City Council may be able to provide information on the height at which your property may be flooded.

This brochure and general information on preparing for floods can be found on the SES website at www.ses.nsw.gov.au and Lake Macquarie City Council website at www.lakemac.com.au.

How the SES can help you
The State Emergency Service is responsible for responding to floods in NSW. This includes planning for floods and educating people about how to protect themselves and their property.

During flash floods, the SES will provide flood information, safety advice and may provide assistance with property protection and water removal. Where appropriate, the SES will conduct evacuations and undertake flood rescue.

www.ses.nsw.gov.au

FOR EMERGENCY HELP IN FLOODS AND STORMS CALL THE SES ON 132 500
FOR LIFE-DANGEROUS EMERGENCIES CALL 000 (TRIPLE ZERO)

SES Website
www.ses.nsw.gov.au
Cooranbong SES Unit
02 4277 1233
Lake Macquarie City SES Unit
02 4914 1611
Lake Macquarie City Council
02 4921 6333
Lake Macquarie City Council Website
www.lakemac.com.au
Bureau of Meteorology Website
www.bom.gov.au

Protecting yourself from a flood
Top: Wednesday Street, Dora Creek, 9 June 2007 flood; Bottom: Newnott Road, Dora Creek, 8 June 2007 flood.

Photos courtesy of John Ulzen
Learning: Turn forecasts into warnings for real time flood events

Action: Implement Integrated City-Wide Flood Warning System

Developed 2013 in three components:

1. Feasibility and Options Assessment
   - Identify water level gauge locations
   - Establish gauges, pluviometers and instrumentation

2. Supply and Installation (2014)
   - Install optimal number of water stations and pluviometers
   - Install software, telemetry and web to display gauge data, alarm management

3. Community Engagement
   - City-wide community promotion of the flood warning system
Learning: Be alert and aware to the dangers of rising floodwaters on roadways

Action: Install Flood Depth Marker Poles and Warning Signs at flash points

Stingaree Pt Dve  Dora Creek
Baker St  Dora Creek
Stingaree Pt Dve  Dora Creek
Oakdale Rd. Gateshead
Oakdale Rd  Gateshead
Marks Point Rd, Marks Point
Action: **Install Flood Depth Marker Poles and Flood Warning Signs at flooding flash points**
Learning: Involve the community in preparedness and awareness programs

Action: Utilise the Sustainable Neighbourhoods Program to engender community participation in major flood event awareness and preparedness

Sustainable Neighbourhoods in the City of Lake Macquarie
**Sustainable Neighbourhoods Program**

- Encourage resilient and connected community groups to care for the environment
- Collaborate with City residents to plan and implement community actions
- Work on a range of community-based sustainability projects, including addressing threats to the environment (floods) neighbourhood by neighbourhood

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**About the Sustainable Neighbourhoods Program**

Lake Macquarie City Council is committed to caring for our local environment and making a fair contribution to a happy, sustainable planet.

Council is partnering with local communities to actively plan and implement actions to reduce our city’s ecological footprint, neighbourhood by neighbourhood.

**The neighbourhood approach: global problems, local solutions**

Neighbours will decide how they can individually and collectively contribute to sustainability, supported by the expertise of Council and other networks.

“Every community has more potential resources than any one person knows.”

Miko Groen, ABCD Training and Community Organizing.

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**Sustainable Neighbourhoods**

- Reducing our City’s ecological footprint, neighbourhood by neighbourhood

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**Climate Ready Dora Creek**

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**Priority Actions 2010-2012**

Sustainable Neighbourhood Action Plan
Learning: Reduce the impact of flooding and flood liability on individual owners and occupiers and reduce private and public losses resulting from flooding

Action: Undertake flood studies and floodplain risk management studies and plans for prioritised City catchments

Flood studies and flood risk management studies/plans completed since 2007

* North Creek Flood Risk Management Study/Plan ( Warners Bay ) - 2010
* LT Creek Flood Study ( Fassifern ) - 2011
* Stony Creek Flood Risk Management Study/Plan ( Blackalls Park/ Toronto ) - 2011
* South Creek Flood Study ( Warners Bay ) - 2011
* Lake Macquarie Waterway Flood Study & Flood Risk Management Study/Plan – 2012
* Winding Creek Flood Study – 2013 ( Plan in progress 2014 )
* Jewells Wetland Flood Study - 2013 ( Plan in progress 2014 )
Learning:  Enhance Council’s development and compliance procedures relative to floodplain risk management

Action:  Implement Development Assessment and Compliance Measures

Floodgate Barriers installed as a rapid deployment mitigation measure at Convenience Store located in Swansea township Commercial Centre

Each barrier offers the equivalent protection of fifty sandbags, yet they are deployable in just minutes by one adult
Development Assessment and Compliance Measures
Gate posts ready for installation of Floodgate barrier inserts in the event of a flood at Woolworths Supermarket located in Swansea Commercial Centre

Doorway Floodgates

Floodgate barriers
Development Assessment and Compliance Measures
Enforce minimum floor levels for development around Lake waterway foreshore

Three generations of floor levels at Swansea

Current Flood Planning Level (required floor level)
7.74 ft AHD

7.74 ft AHD
6.17 ft AHD
3.94 ft AHD

Post 2007 floor height at Swansea

LAKE MACQUARIE CITY COUNCIL
LAKE MACQUARIE WATERWAY FLOOD RISK MANAGEMENT STUDY and PLAN
Development Assessment and Compliance Measures
Encourage resilient housing and building designs

Multi-storey residential unit block with a lower floor that can be converted to another use at any given time
(Source: Google maps street view 2013)

Two storey home with flood resistant lower floor design & flood compatible construction materials
(Source: HBNBG 2006)
Learning: *There needs to be clear and manageable emergency planning*

**Action:** Prepare Lake Macquarie City Flood Emergency Sub-Plan and adhere to State Government Storm Plan 2013

- A sub-plan of Lake Macquarie City Local Disaster Plan
- Prepared in accordance with provisions of the *State Emergency and Rescue Management Act, 1989*
- Plan is coordinated by SES with input from Council
- Plan covers preparedness measures; conduct of response operations; coordination of immediate recovery measures
- Sub-Plan draws on historical / intellectual intelligence data from 2007 storm / flood event.
Learning: *Liaise more with insurance agencies*

Action: *Work with insurance agencies to develop flood insurance information to assist with formulating premium reductions for residents and businesses.*

*Initiatives include:*

* Consult with Insurance Companies to develop ‘clearer to understand’ insurance information  
  *Note:* Flood insurance in Australia is privately (not Govt) operated

* Provide building floor levels and hazard mapping information to the insurance industry, as available

* Investigate resilient building design guidelines for flood mitigation to reduce risk and thereby reduce insurance premiums

* Encourage the insurance industry to offer reduced premiums on developments that apply design options to mitigate flood risk exposure
Pasha Bulker - 84,592 US ton Panamanian bulk carrier grounded by storm at Nobby's Beach Newcastle Australia on 8th June 2007

“Vows made in storms are forgotten in calm” Thomas Fuller (English writer in 1600s)
Twin opening span steel bridges at Swansea township, which is the gateway entrance to Lake Macquarie waterway from the South Pacific Ocean.
Acknowledgements

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• Slide 17 - Photo courtesy Jim Bodycott
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