

# The 2011 Queensland Floods



**Bill Syme**  
FMA Conference, San Diego  
September 2011




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## Why were Qld Floods Surprising?

[The Chronicle]

**Different types**

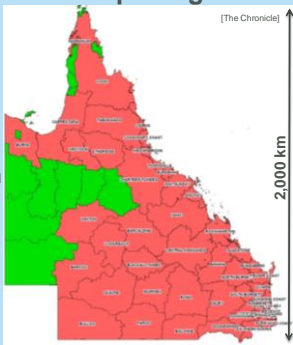


- Flash floods
- Long duration floods
- Repeat floods (Dalby 5 times!)

**Severity**

- Significant number of locations experienced greater than 1 in 100 year rainfall

**Geographical extent**

- North Queensland to NSW
- Coastal areas and inland
- Rural areas, towns and cities


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## Flash Flooding – Toowoomba

Within an hour of rainfall, creeks of Toowoomba had risen several metres.  
The flood wave travelled 6km through the CBD in 30 mins.  
The street drainage system was designed for a 2-5 year rainfall event  
Major sheet and roadway flow as well as creek flooding  
Catchment increasingly urbanised – faster and less attenuated runoff

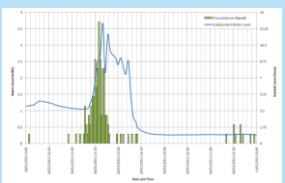






Figure 8.1 Recorded Granite Creek Water Levels at Granite Stream gauge, 10 January 2011 [news.com.au]


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### Flash Flooding – Helidon

[The Courier Mail]

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### Long Duration River Flooding Goondiwindi

14<sup>th</sup> January 2011: Predicted 10.8  
Reached 10.65m  
Levee crest at 11m

[Goondiwindi Historical Society]

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### Questions Arising

**Flood Forecasting and Warnings**  
Were the forecasts accurate and the warnings useful?

**Community Preparedness**  
Did we know what to do?

**Operation of Somerset and Wivenhoe Dams**  
Did the operation of the flood gates reduce flooding?

**Emergency Management**  
How did we go managing the emergency?

**Development Controls**  
Did our planning controls reduce the risk to lives and damage to property?

**Design and Location of Infrastructure**  
Were our emergency services and key transport routes fully functional?

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## Flood Forecasting and Warnings

The Bureau of Meteorology (BoM) issues forecasts predominantly as predicted levels at gauges

These forecasts are relayed to the community via the web/phone and the media who must quote verbatim

Number one criticism was that many (most?) people did not know what a flood gauge height meant

Does 5.5m mean we get flooded? – no idea

When do we lose access? – no idea

Should we raise or remove our possessions? – no idea

The accuracy of the forecasts not great, but at least they tended to be conservative!

Key recommendation from inquiry is to use a hydraulic model for forecasting (only a hydrologic model was used)




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## Community Preparedness

In many areas very poor

People in general had little idea of what to do

Those that experienced previous floods much more astute

If we were a prepared community would we have had this...

ABC




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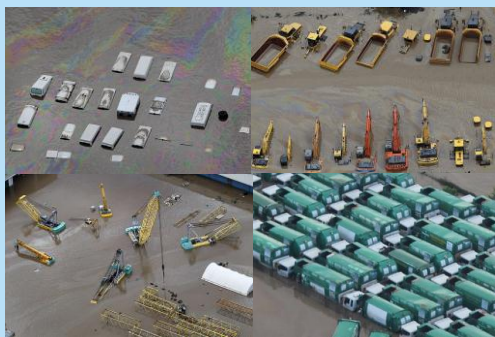
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and this?




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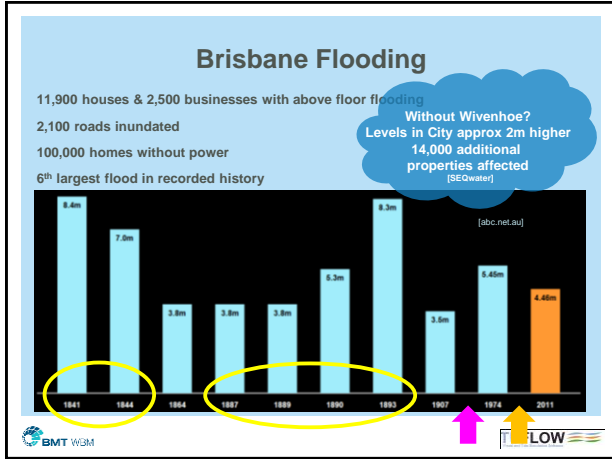
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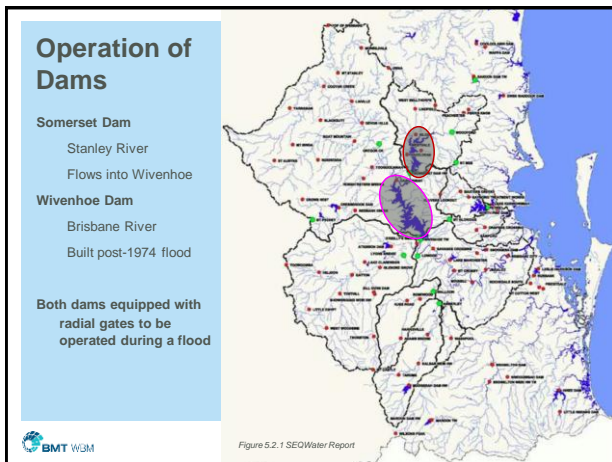
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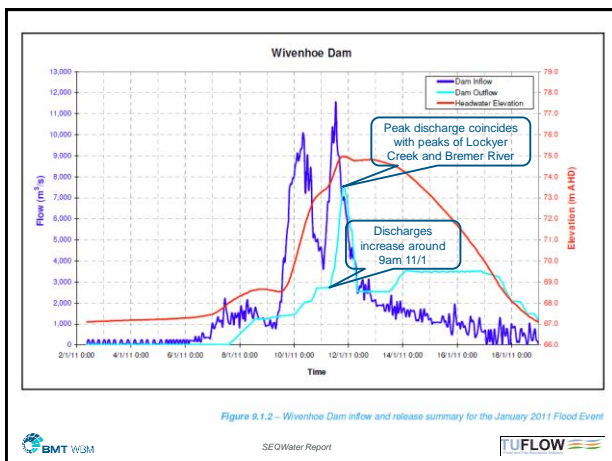
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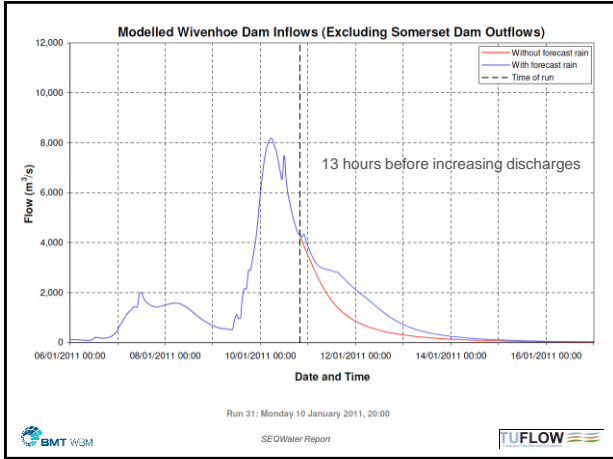
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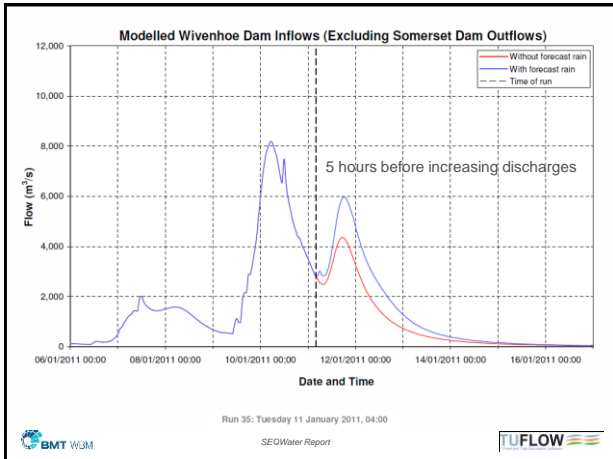
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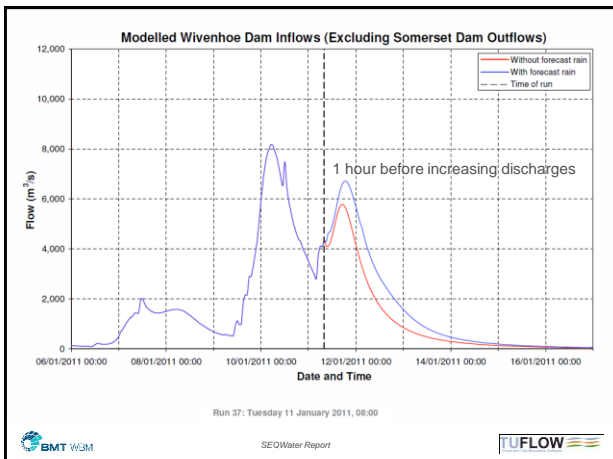
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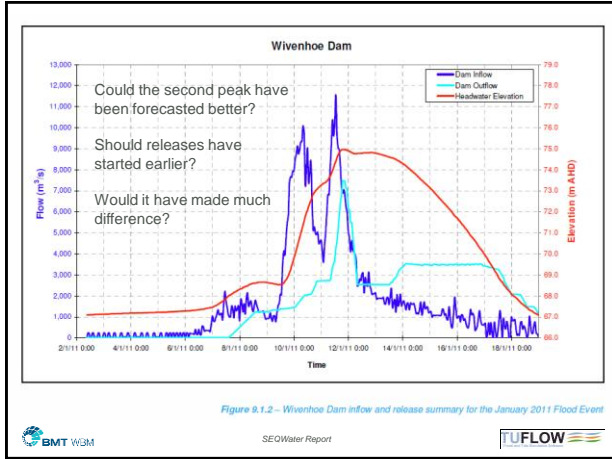
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### Wivenhoe Dam



Provided substantial flood mitigation

Questions over timing of releases prior to and during the second flood peak

Highly effective at reducing flood peaks but did the presence of the dam give residents and decision makers a false sense of security...  
The larger the flood the more ineffective the dam...

Questions over effect of dam on design flood levels for development controls

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### Wivenhoe Dam



Provided substantial flood mitigation

Questions over timing of releases prior to and during the second flood peak

Highly effective at reducing flood peaks but did the presence of the dam give residents and decision makers a false sense of security...  
Also, the larger the flood the more ineffective the dam...

Questions over effect of dam on design flood levels for development controls

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### Emergency Management

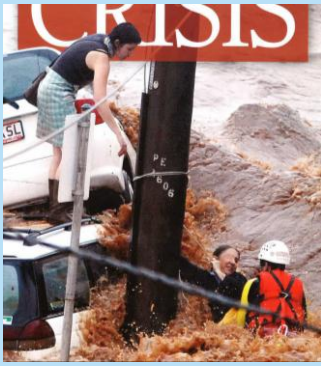
General opinion is the floods were handled well (given the extent)

Strong and compassionate leadership by key politicians



Outstanding effort by rescue personnel

However, 35 people died with some still missing presumed dead

Government acting on recommendations from Inquiry



The Toowoomba Chronicle


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Post flood clean-up carried out with great community spirit



Piles of household goods damaged in the Brisbane Flood littered suburban streets after an army of volunteers turned out to clean up Australia's flood-torn city. PHOTO: Katie Sarkis AFP





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### Development Controls

Example house in Rocklea, Brisbane



Jan 2011 flood level - habitable floor level + 500mm 10.6m

Jan 2011 Approx 10.1m



Defined flood event - habitable floor level + 500mm 8.7m

Previous defined flood event - Approx 8.2m

Existing floor level Approx 6.825m

Ground level Approx 5.25m

[The Courier Mail]


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### Development Controls

After the 2011 flood, Brisbane City Council relaxed height restrictions in flood-prone areas and have raised minimum floor level to above 2011 levels...

1974  
2011  
2011 OTE

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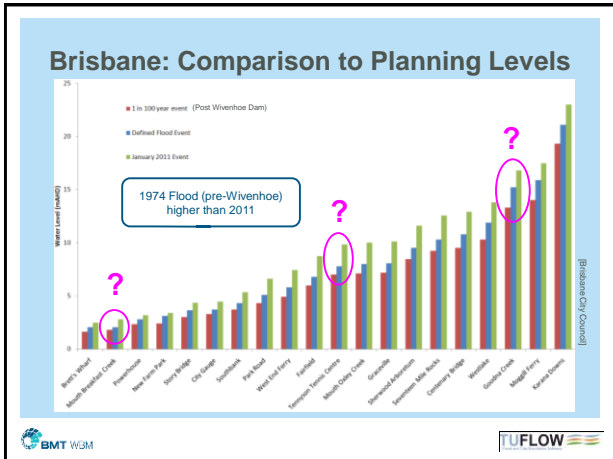
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### Review of Infrastructure Emergency Services

Main Transport Corridors

Location of Hospitals, Police, Fire, Ambulance

Rail [Tony Webber]

Rockhampton Airport [Tony Webber]

Police [businessday.com.au]

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### Scorecard

**Flood Forecasting and Warnings**  
Were the forecasts accurate and the warnings useful? ★★☆☆☆

**Community Preparedness**  
Did we know what to do? ★☆☆☆☆

**Operation of Somerset and Wivenhoe Dams**  
Did the operation of flood gates reduce flooding in Ipswich & Brisbane? ★★★★★

**Emergency Management**  
How did we go managing the emergency? ★★★★★

**Development Controls**  
Did our planning controls reduce the risk to lives and damage to property? ★☆☆☆☆

**Design and Location of Infrastructure**  
Were our emergency services and key transport routes fully functional? ★★☆☆☆

If I had given 4/5 stars to everything I don't think I'd be giving this presentation!





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### Where to From Here?


Queensland needs to adopt national best-practice guidelines for flood planning and management


NSW Flood Risk Management approach an excellent example (NSW has pursued a very active flood management program for over 30 years)

Queensland's guidelines ~15 pages (including bushfires)

NSW's guidelines ~200 hundred pages!

**Invest in the Future – Invest in Flood Management**






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### NSW Flood Risk Management Process

[www.environment.nsw.gov.au/floodplains](http://www.environment.nsw.gov.au/floodplains)

**Flood Modification Measures**



**Steering Committee**

Collect Data

Define Existing Flood Behaviour



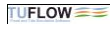
Investigate Management Measures

Flood Risk Management Plan

Implement Management Plan

**Property Modification Measures**

**Response Modification Measures**


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### Risk Based Approach

Take into account

- ALL events (not just the 100 year event)
- Warning times
- Hazard level
- Uncertainties
- Climate Change

Flash flood areas should have different controls than areas of long-duration river flooding

Use extreme events for evacuation planning and emergency management

(Coopewind Historical Society)

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### Development Control Matrix

DRAFT FOR REVISION (Issue 1) - FOR CONSULTATION ONLY - NOT FOR CONSTRUCTION

**DEVELOPMENT WITHIN A RESIDENTIAL AREA**

Controls	Development Type	100 Year Hazard			500 Year Hazard	
		Low Hazard	High (Depth) Hazard	High (Floodway) Hazard	Rare Low Hazard (Extreme Flood Fringe)	Rare High (Floodway) Hazard
Fill Level	New Development	No Min	No Min		No Min	No Min
	Emergency Services	PMF Flood Level			PMF Flood Level	
Floor Level	Habitable Building	100y level +0.5m	100y level +0.5m		100y level +0.5m	100y level +0.5m
	Ancillary Building (eg shed)	10y level +0.3m	10y level +0.3m		10y level +0.3m	10y level +0.3m
	Emergency Services	PMF Level			PMF Level	

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### Property Modification Measures

Development Control Matrix Example

Example – Mechanics Garage

- High Hazard Depth
- Rare Extreme Hazard
- Floor Level F2 Required
- Floor Level = 59.3mAHD

**TABLE 2-3: RESIDENTIAL, COMMERCIAL AND INDUSTRIAL DEVELOPMENT WITHIN URBAN AREAS**

Controls	Development / Building Type	No Hazard	Flood Hazard Category				Additional Constraint <sup>1</sup>
			A Flood Fringe	B High Hazard Depth	C High Hazard Floodway	D Rare Extreme Hazard	
Floor Level	New Ancillary Building (eg shed, carport)	NA	F3	F2	F1		
	New Commercial or Habitable Building	NA	F2	F2	F1		
	New Habitable Building	NA	F3	F3			F3
	Building Extension	NA	F4a	F4b			F4a
	New Emergency Services (eg hospitals, etc)	NA	F5				
	Critical Infrastructure (eg major telephone exchange, etc)	NA	F5				
	New Urban Community Service (schools, etc)	NA	F5a				
	Special Evacuation Needs (eg aged care)	NA	F5a				

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### Flood Warnings

Gauge heights – let's make them mean something!

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### Once you have identified at risk buildings...

Send messages to residents and businesses

Critical gauge heights for each building placed somewhere permanent (eg. inside the electricity box)

Occupants / Owners can make an informed decision on the action to take

Very difficult in areas with flash flooding and little warning time – need greater focus on development controls to not have people in the firing line

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### Flood Totems

The Next Step on from Gauge Heights

Links Response Modification Measures  
Help solves communication problems  
Being trialled in Innisfail, North Queensland



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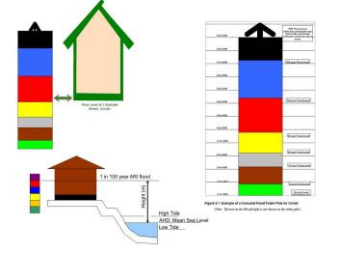
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### Flood Totems

The Next Step on from Gauge Heights

More palatable to real estate agents and landowners  
Cornerstone for flood warnings  
Link to gauge height forecasts  
Indicates likelihood of inundation  
Easier to communicate to the community  
Household/Business Diagrams (eg. place in electricity box)  
Many others...



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### Community Preparedness

Raise awareness (probably not necessary in Queensland right now!)

Flood evacuation plans  
Businesses  
Coordination by councils  
Educate residents

Continuous community consultation and reminders essential



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## In Conclusion

Our Qld communities and businesses could have been much better prepared  
Forecasted gauge heights were of little meaning to most  
Qld's approach to flood risk management and planning tends to be reactive rather than proactive (some councils excepted)  
Qld needs to proactively pursue a flood risk management process  
Qld can learn a lot from the NSW Flood Risk Management process and elsewhere



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Thank You



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